THE AEROPLANE

Incorporating
Aeronautical Engineering
Edited by - - THURSTAN JAMES

Founder and First Editor
(1911-1939), C. G. GREY

Proprietors:
TEMPLE PRESS LIMITED
Chairman and
Managing Director:
ROLAND E. DANGERFIELD

Head Office:
BOWLING GREEN LANE
LONDON, E.C.1
Telephone: Terminus 3636
Telegrams:
"Pressimus London Telex"
Telex 23859

Vol. XCV. No. 2459 OCTOBER 17, 1958

Annual Subscription Rate: U.K. £4.15.0.
Overseas £5. Canada and U.S.A. $15.00

A NEW SORT OF SHOW

FOR the past two weeks there has been plenty of excitement at the week-end. A fortnight ago we had the wonderful Comet double event to talk about. Incidentally, it is a most remarkable thing how, on such occasions when something worthwhile has been achieved and the people of this country, and the aircraft industry in particular, have something to be proud of, there are always those anxious to explain how really there is nothing to be proud about or to express regret at what they regard as unseemly self-praise. It is a good thing for all of us that the people who get things done take no notice of such doleful denigrators.

This week we have an American achievement to be pleased about. And how delighted we all have been to hear that the U.S.A.F. had successfully launched its second Moon probe. The fact that this four-stage rocket sailed a mere 80,000 miles into space and fell back a day or two later to be burnt up in the atmosphere did but little to diminish the pleasure felt at this wonderful feat of getting so far out into space at the second attempt. There cannot be many people now who doubt the practicability of getting a rocket to the Moon. A year or two ago few people would admit that such a thing was possible. Better luck next time, U.S.A.F.

After turning our eyes to the Atlantic and then lifting them to nearer (rather than outer) space, some of us in aviation could with advantage turn them nearer home. Recently, mention of the Air League of the British Empire in various circles has been certain to raise blood pressure and to trigger off unprintable references to a certain two-headed bird. It is therefore with considerable gladness we have discovered in the October issue of the *R.Ae.C. Gazette* an article by Air Cdre. Paul, the new secretary of the Air League, in which a notably airmanlike tone is dominant. The article is concerned with flying, not with the putting up of memorials to aviators of long ago.

The objective of the author is to get something done about building aeroplanes which people who want to fly can afford to fly and even to buy. We are quite sure that it will be read with enthusiasm by R.Ae.C. members and we suggest to would-be flyers who are not members that they should do their best to get hold of a copy of the October number of the *Gazette*.

The author begins his article by deploring that of the nearly 200 aircraft taking part in the Farnborough Show only one suitable for flying club or civilian instructional applications appeared in the air. Soon, he emphasizes, when the last of the ageing war-surplus trainers are finished and when the numbers of trained ex-Service pilots are seen to be insufficient to meet civil requirements the lack of basic trainers will be accepted as the serious thing it really is.

He next studies, albeit briefly, a situation which has perplexed many of us; namely the tremendous public interest in the S.B.A.C. Show for which this year something like a quarter of a million people bought seats, contrasted with the indifference of the same public towards the matter of flying for fun, flying for pleasure or flying oneself to get to some other place. In Air Cdre. Paul's view the situation seems to be one in which the general public are increasingly regarding flying as a spectacle wherein they watch the gladiators, but in which they no longer expect to take part. In the same way that recruits to sailing or motor-boating are attracted to such sports by clubs rather than by watching large liners so, the author of the article considers, recruits for flying are mostly attracted by the intimate atmosphere of flying and gliding clubs.

Yet until more people can be interested in the possibilities of economical flying there can be no large demand for light aircraft and until there is such a demand neither aircraft nor, what is more important, the necessary specialized powerplants will be forthcoming. How is this vicious circle to be broken? Air Cdre. Paul puts forward a solution which is simple and in the early stages, at least, not likely to cost much money. It is the mounting of a National Light Aircraft Show.

At this stage the immediate query that presents itself is whether the adjective "national" is not an unnecessary limitation. As the Air Commodore points out at the beginning of his article only one suitable aeroplane was flown at Farnborough and though later he mentions one or two more he would not suggest, we are sure, in these early days that such a show would attract half as much attention if it were limited to existing British products. What the first Light Aeroplane Show must do is to educate and evangelize. It must make converts. To do this the widest possible array of light aircraft must be gathered in one place and shown off in the air. As public interest grows, so will the demand for British-built products.

Incidentally, somewhere in the proposed Show there ought to be a large three-dimensional model showing how private pilots can still get about the country in a light aeroplane in spite of the ever-increasing complexities of Air Traffic Control. It is indeed a matter for congratulation when M.T.C.A. re-sites an "airway" to help a gliding club, as has recently happened. Light aeroplane pilots, actual and potential, should take heart.

MATTERS OF MOMENT

Into Cislunar* Space

ON October 11 it was a year and a week ago to the day that the first artificial Earth satellite had been flung into orbit. It was on October 11 that another man-made object, a miniature laboratory crammed with 25 lb. of complex electronic equipment, was speeding on its way to the Moon, 221,000 miles away. After Sputniks and Explorers had come the Pioneer.

Pioneer was 88 ft. long and weighed 52 tons. Its first stage was a Thor IRBM and its second and third stages were modified Vanguard components. The final, fourth, stage has been described as resembling a child's spinning top and was spun at some 200 r.p.m. Eight small vernier rockets are said to be located around the base of the fourth stage to be fired by remote control and give final velocity adjustment.

As news of the launch was hurriedly broadcast, tracking stations around the World ended their long vigil and began to search. First to pick up the Pioneer's beacon was a radio station on Long Island. Four minutes later the giant ear at Jodrell Bank heard its transmissions loud and clear. The probe was right on time and apparently on course.

Signals were also coming in at Slough, and from Sweden came further confirmation that the probe was going strongly. Meanwhile the sub-stellar path of the Pioneer had crossed the Atlantic to North Africa, due to the tangential component of Earth rotation, and was now drifting back over the Atlantic as its effect diminished whilst the Earth continued to turn.

Throughout the first day Jodrell Bank continued to measure the probe's co-ordinates at regular intervals, the data being teletyped to the trajectory computer at Los Angeles. By evening it was evident that the probe was not following the hoped-for trajectory and a miss distance of more than 50,000 miles could be expected. By nightfall the tracking stations at San Diego, California, and Hawaii had taken up the task of keeping Pioneer in view, later handing over to Singapore, with Jodrell Bank once again in a favourable position next day.

Meanwhile the probe's speed was diminishing rapidly, slowed inexorably by the Earth's gravitational attraction. Four hours after launching it had dropped to 11,000 m.p.h., and after little more than 24 hours it was down to one mile a second. It was beginning to appear doubtful whether its apogee would even reach the Moon's orbit.

If all had gone strictly to schedule the probe should have been due in the vicinity of the Moon 62 hours after leaving the Earth. It was then planned to fire a retarding rocket in the nose of the probe by a command signal from the Hawaii station.

The purpose of this retarding thrust was to destroy some of the speed with which the probe would otherwise "fall past" the Moon due to the lunar attraction. This, it was hoped, would convert a possible hyperbolic orbit past the Moon into a capture ellipse. Should this fail, then the probe, as it never reached escape velocity (25,500 m.p.h.), would return earthwards.

In the meantime the data pouring back from the Pioneer's transmitter were being tape-recorded and decoded as it continued to plummet through space. The internal temperature had fallen from 40° F. to stabilize at 35° F., and a radiation intensity of 4 Roentgens an hour was a hopeful indication that Man could exist in space with safety. The probe had been struck by only one micro-meteorite in the first 12 hours, and cislunar space seemed fairly free of debris. No information had been given out as to the variation in magnetic field strength between the Earth and the Moon, for the measurement of which a tiny magnetometer is believed to have been carried.

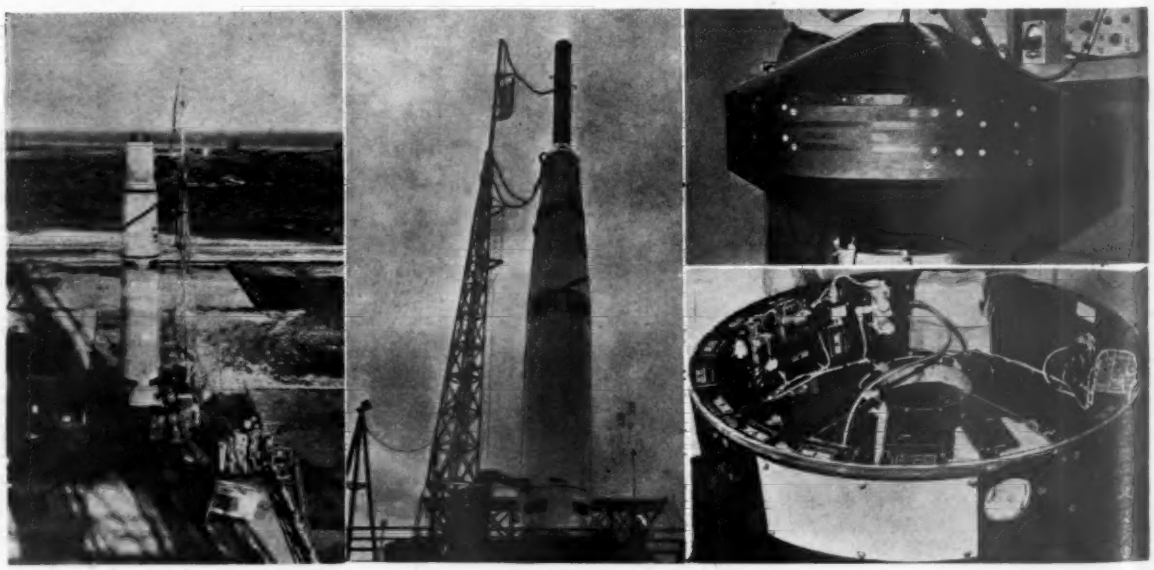
As everyone now knows the path eventually followed by Pioneer failed to take it near enough to the Moon and after attaining a maximum distance of 79,212 miles into space it returned earthwards and was burnt out in the atmosphere in the early hours of October 13. Preliminary reports from America suggest that this deviation from what might have been a successful course was primarily due to a slight error in the launching angle—a figure of 3½° has been mentioned. It has also been reported that it never reached escape velocity because its speed in the launching stages was less than had been expected.

However, despite Pioneer's failure to attain its primary objective, the events which were initiated on October 11 can be counted as a tremendous step forward in astronautical development. By reaching out 80,000 miles into space and sending back its coded messages, Pioneer certainly justified the name given to it.

*Cislunar: a term coined by the U.S. scientists to describe space "on this side of the Moon".

Cranfield's Open House

A VISIT to the College of Aeronautics with no specific object in view other than to talk to the staff and see something of the work done at the College is always well worthwhile—not only because of the enthusiasms of the teachers but by reason also of the breadth of the aeronautical interests of those taught. Just such an occasion was afforded on October 10 when



MOONPROBE PIONEER.—Left, the Thor first stage on the launching pad. Centre, the complete Pioneer with final stages and "terminal instrument package" housed in the upper fairing. Right, top, the spinning-top shape of the probe. Right, below, the instruments in the 29-in.-dia. container.

The interior of St. Clement Danes—the church of the R.A.F.

Cranfield—as the College has come familiarly to be known—threw open its gates and invited inspection by a large number of distinguished guests.

There is, of course, so much going on in the laboratories and workrooms at Cranfield that one day barely suffices to give a visitor more than an all-too-short glimpse of some of the more interesting experiments and work done. However, the 750 or so visitors on October 10, and another 6,000 the following day, when members of the public were invited to visit the College could not complain on that score and the staff and the students did much to make their visits enjoyable. We propose to deal at greater length next week with some of the things they saw.

Aerojet and Bristol

SOLID propellent rockets will be made by Bristol-Aerojet, Ltd., in the United Kingdom. This follows an agreement between the Bristol Aeroplane Co., Ltd., and the Aerojet-General Corpn. of Azusa, California.

Growing use of solid rather than liquid propellent rockets has resulted from the greater reliability and simpler handling of the solid type. Against this, there are still some problems of portability and "shelf life."

Aerojet-General was started by Dr. T. von Kármán in 1942 and first developed rockets for aircraft assisted take-off. It is now the leading manufacturer of solid-propellent rockets in the U.S.A., and is developing power units for the Polaris and Minuteman. Bristol's solid-propellent rocket work includes the manufacture of rocket motor cases for most of the British guided weapons using such units. The company's products in this field include the cases for the Raven high-altitude research vehicle and for anti-tank missiles.

Directors of Bristol-Aerojet, Ltd., will be Sir W. Reginald Verdon Smith (chairman of the Bristol Aeroplane Co., Ltd.), chairman; Rear-Admiral Sir Matthew Slattery, C.B. (chairman of Bristol Aircraft, Ltd., and of Short Brothers and Harland, Ltd.); Mr. W. Strachan (general manager of Bristol Aircraft, Ltd., Weston Division), managing director; Mr. Dan A. Kimball (president of Aerojet-General Corpn.); Sir Alwyn Crow, C.B.E. (Aerojet British representative); and Mr. W. E. Zisch (vice-president and general manager, Aerojet-General Corpn.).

Centaurians in the City

ON October 7 the captain and officers of H.M.S. "Centaur" were entertained to dinner by the Master and Livery of the Worshipful Company of Coachmakers and Coach Harness Makers. During the time Gp. Capt. F. C. V. Laws was Master, H.M.S. "Centaur" was adopted by the Company and the occasion marked by the presentation (THE AEROPLANE, January 13, 1956) of a Drum Major's Mace, Sash and Gauntlets. On this occasion the Master, Mr. R. D. Smith, announced the presentation of a silver bugle.

In thanking the Coachmakers for their generosity, Capt. Horace R. Law, O.B.E., D.S.C., R.N., said that the ship was on trials but aircraft were to be taken aboard next month. By April next year the ship's company should have something to show their hosts!

A Remembrance for Ever

ST. CLEMENT DANES, the church of the Royal Air Force, is to be reconsecrated by the Bishop of London in the presence of Her Majesty the Queen on Sunday, October 19. Almost totally destroyed in 1941, the shell of the church was handed over to the Air Council by the Diocese of London in 1953 to serve as a perpetual shrine of R.A.F. remembrance.

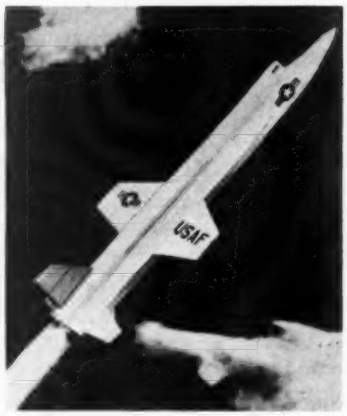
On appeal, a fund of £150,000 was raised. Mr. W. A. S. Lloyd was appointed architect. The accompanying study shows the reconstructed exterior. At the top of the page a photograph shows the interior with its striking contrast between the richly decorated arched white ceiling and the dark stained oak woodwork.

Along the walls, beneath the galleries, ten shrines contain the names of the 125,000 men and women who gave their lives in R.A.F. service during and between the two World Wars.

Very-High-Level Research

TWO weeks ahead of schedule, the North American X-15 research aircraft was due to be rolled out at Los Angeles last Wednesday, October 15. It is intended for very-high-level high-speed flight. It would have been almost in the satellite category, but it is now understood that it will not in fact ever be put into orbit.

The pilot who is to fly it, Scott Crossfield, gave some facts about the aircraft during a panel discussion before the U.S. Air Force Association's annual convention at Dallas, Texas, on September 25, but added little to those already revealed. He said that the first flights will be made in January, and they



An impression of North American's X - 15 research aircraft.

will be made without power. The X-15 will be carried up to about 50,000 ft. under the wing of a Boeing B-52 and then released for glide tests. The tests for the next eight to 10 months will be successively more detailed to ascertain performance. It has been said that the ammonia and liquid-oxygen rocket engine of the X-15 is expected to take it up to a height of about 100 miles, and speeds of up to 18,000 m.p.h. will be attempted.

Crossfield said that when the first powered flight is made it will last for only 20-30 min., and most of that time will be taken up by gliding and the landing. Powered landings, which will probably be at a speed similar to those of contemporary high-speed jet aircraft, may be made later.

The cockpit is pressurized, but the pilot will in fact wear a specially designed full pressure suit.

Data from the X-15 will come from the pilot and telemetry equipment, and will include information on aircraft-motion-versus-pilot's-reaction, structural temperatures, both internal and external, pressure data, physiological data on the pilot, and overall loads on the aircraft.

Two or three more X-15s are to be rolled out closely behind the first aircraft. From inception of the programme to delivery of an actual airframe has taken six years. A total of 300 sub-contractors has been involved.

Ejection Commentary

ACCORDING to the Martin-Baker company, well over 200 successful emergency escapes have now been made with its ejection seats. An interesting point concerning the demand in some quarters for supersonic escape facilities is that of all these ejections only one was made above M = 1, and the average I.A.S. when the aircraft were abandoned appears to be something like 200 knots.

Among the most recent escapes were those of the two R.A.F. officers from the Scorpion-Canberra, which was out of control and breaking up at 56,000 ft., and these are the highest ejections on record. At the other extreme, two naval officers ejected a few days later from a Sea Venom 21 at between 100 and 200 ft. following loss of control 30 sec. after being catapulted from H.M.S. "Ark Royal." The first successful ejection from a Sea Venom, which has not long been fitted with ejection seats, had been in December, 1957, following engine failure at night.

The first emergency ground-level ejection, also recorded early last year, following the crash-landing of two Hunters at Horsham St. Faith and North Weald, and the firing of the Mk. 2H seats during disintegration of the aircraft.

The value of ejection seats was again tragically emphasized last week when a Canberra PR. Mk. 9 crashed into the sea during a test flight from Warton, Lancs. The pilot, Don Knight, of English Electric, was picked up after successfully ejecting, but his observer, who was not provided with an ejection seat in the Canberra 9, could not be found.

Floyd on the Avro Arrow

INFORMATION about the Avro Arrow and its development position was given on October 9 by Mr. J. C. Floyd, vice-president, engineering, of Avro Aircraft, Ltd., at a Press conference before his R.Ae.S. British Commonwealth lecture. A survey of the Arrow's design, based on his lecture, was published in THE AEROPLANE last week.

Mr. Floyd said that the aircraft was originally designed around an American fire-control system and an armament of eight Falcon air-to-air missiles. At a later stage this armament had been changed to four Sparrow missiles, and installation of the Canadian Astra fire-control system had been planned, although this change had not been advocated by Avro. With the recent cancellation of the Astra system the aircraft would revert to the U.S. system and armament, which is understood to be the Hughes fire-control system and Falcon missiles as used on U.S.A.F. F-102 all-weather fighters. This system and armament is available "off-the-shelf" from the U.S. at a considerable financial saving over the Astra system and Sparrow missile. Its adoption should speed the development of the Arrow as a fighting weapon, as the development programme for the Canadian fire-control system would be avoided.

Asked about the future of the Arrow, Mr. Floyd said at present Avro had a firm order for 36 aircraft. A decision on a further production had been required recently if there were to be no break in the production flow between the first 36 and later aircraft. The Canadian Government had felt unable to make a decision now and had deferred it until the end of next March.

The decision to adopt Bomarc ground-to-air missiles had come as no surprise in Canada; the official policy had always been for a defence system which combined missiles and manned aircraft. Defence chiefs still wanted manned interceptors and Mr. Floyd was hopeful that further Arrow production would be authorized in March. But he felt that it would be naïve to expect that the project would not be dropped entirely if the decision was against further production. The Government was unlikely to continue production of the 36 aircraft now on order if no large production order was contemplated.

Asked how the Arrow fitted in with the British O.R.339 requirement for a strike aircraft, Mr. Floyd said that a range of missions for the Arrow had been investigated. It had been designed as a medium-range interceptor, but had long-range potential. Even in its present medium-range form it had a range greater than that of most current interceptors.

Other points made by Mr. Floyd were that the Arrow weapons-bay was of a similar size to the B-29 bomb-bay; that an excellent performance had been achieved with initial aircraft having J75 engines, and that this would be bettered by Iroquois-engined Arrows. The Orenda Iroquois was in the 20,000-lb. dry thrust class; at high altitude its ratio of after-burner to engine thrust was very high and it was acting largely as a ramjet. The Iroquois would be installed in all Arrows after the fifth to be built.

Mr. Floyd delivered his lecture at the Royal Institution in classic fashion, speaking with only occasional reference to notes. He opened by saying it might appear that in Canada, as well as in Britain, the "Wright brothers were being abandoned for sophisticated fireworks" before he went on to describe Arrow development. He also showed an excellent colour film covering the design, aerodynamic and structural development, and flight-testing of the Arrow. The use of chase aircraft and the thorough photographic coverage of test flying was interesting.

Speaking of Arrow performance, Mr. Floyd said that the aircraft was designed to operate from 6,000-ft. runways. Test flying was going well and in the words of a security release "the aircraft had exceeded 1,000 m.p.h. at 50,000 ft. while climbing."

News of Aircraft, Engines and Missiles

VTOL RESEARCH.—The Piasecki VZ-8P aerial jeep flat-riser made its first flight at Philadelphia on October 12.

ORPHEUS IN GERMANY.—B.M.W. Triebwerkbau G.m.b.H., of Munich, has purchased an option to build the Bristol Orpheus lightweight turbojet under licence in Germany. Agreements already exist for the manufacture of this engine in Italy, France and India.

WEIGHT LIFTER.—According to *Aviation Daily*, a new class record is being claimed in the "payload-to-2,000-m." category by a Boeing KC-135 Stratotanker, which has lifted 77,350 lb. to this height.

FRENCH CONVERSION.—A Beechcraft 18 with two Turboméca Bastan turboprops made its first flight from Bordeaux-Mérignac airfield on September 19. It will be used by the French Technical Aeronautical Service as a flying test-bed for the Bastan turbine. This engine will be used in the second prototype of the Morane-Saulnier M.S.1500 Épervier army co-operation aircraft and the production version of the Sud-Aviation SE.116 Voltigeur tactical support aircraft.

REGISTER REVIEW.—The October issue of the "British Register of Civil Aircraft" published by the A.R.B. gives the following totals for aircraft holding current C. of A.s: B.O.A.C. and B.E.A., and their associated overseas companies, 215; independent operators, 266; Government departments, 17; clubs and groups, 298; training schools, 40; business and private, 358; aerial work, 142; miscellaneous, 29—a grand total of 1,365.

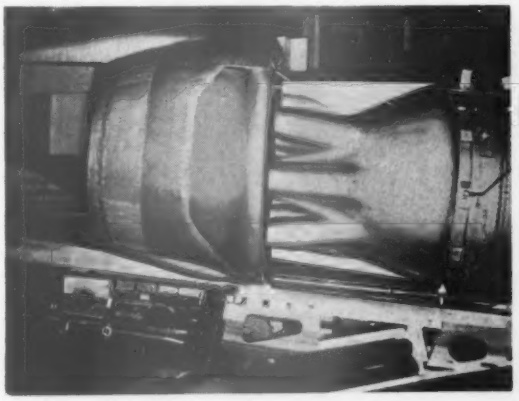
KAMAN CONTRACT.—The Kaman Aircraft Corpn., of Bloomfield, Conn., has been awarded a contract, valued at $10 million, for 54 H-43B helicopters by the U.S.A.F. The type is powered by an 825-h.p. Lycoming T53 shaft turbine.

NEXT WEEK

AT the time when B.O.A.C.'s de Havilland Comet 4 has just inaugurated jet services over the Atlantic we are publishing, in our issue of October 24, a special supplement on the history, development and operation of this British aircraft. The features will include one of our specially commissioned cut-away drawings by J. H. Clark and a four-view tone drawing by Roy Cross; the Rolls-Royce Avon turbojets, technical aspects and the industrial background of the Comet will all be covered.

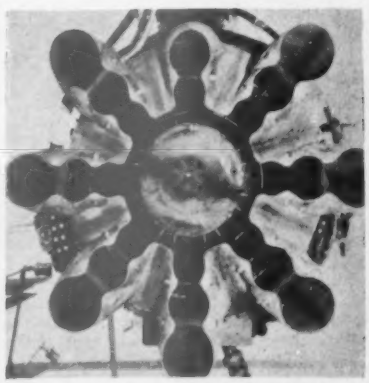
As the demand for this issue is bound to be considerable, please give an order to your newsagent or bookstall in advance. The price will be the usual 1s. 6d., or 2s. 1d. by post from the publishers, Temple Press Limited, Bowling Green Lane, London, E.C.1.

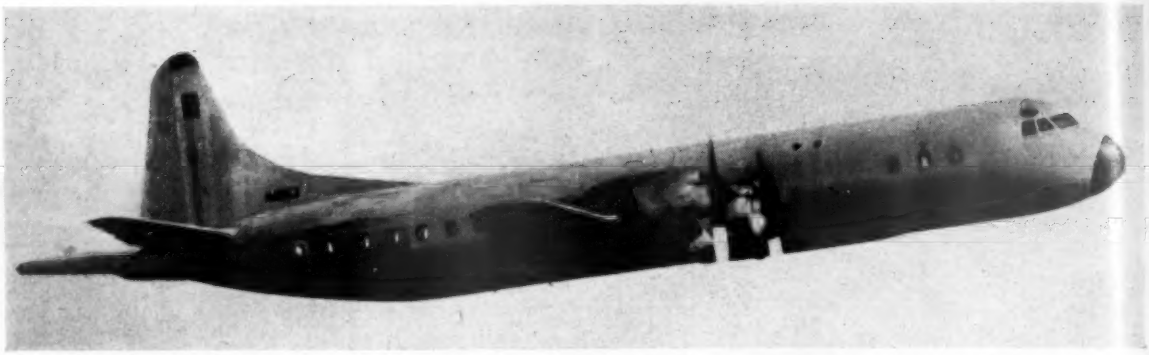
ATLANTIC VICTOR.—First crossing of the Atlantic by a Handley Page Victor bomber was on October 10; the aircraft was taking Air Vice-Marshal K. B. B. Cross to March A.F.B., California, for the U.S. strategic bombing contest. The flight from Gaydon to Goose Bay, against winds which reached 115 m.p.h., took 5 hr. 14 min. The Victor flew on to March A.F.B. on October 11 via Lincoln A.F.B. in Nebraska.



EFFLUX HARDWARE.—Below, features of the Boeing 707 powerplant installation include in the foreground a noise-reducer unit from the outboard Pratt & Whitney JT-3 above it, seen with thrust-reverser doors beginning to close. The inboard engine has the clamshell doors closed. Just to the left of the outboard engine is the extended leading-edge flap.

DC-8 EJECTOR NOZZLE.—Latest development for the Douglas DC-8 is an ejector nozzle said to decrease sound and increase thrust at take-off. It has built-in thrust-reverser doors. Above, the shroud at take-off. Note the thrust-reverser louvre. Below, the exhaust nozzle, tail-on.





ANTI-SUBMARINER.—The U.S. Navy has awarded a contract of more than $10 million to Lockheed for pre-production work on the P3V-1 Electra, developed from the commercial turboprop transport. The naval version first flew on August 29.

Commercial Aviation Affairs

DAILY COMET.—It has now been confirmed by B.O.A.C. that a daily North Atlantic service with Comet 4s will start on November 14. On that day the Comets will take over the Monarch service between London and New York which is at present operated with Stratocruisers.

U.K. AIR MOVEMENTS.—There were 46,360 air-transport movements at United Kingdom aerodromes in July, 1958, an increase of nearly 4% compared with July, 1957. The number of passengers handled in the same period increased by 2% to 1,020,829. Freight traffic amounted to 23,347 short tons, an increase of 29.5% over July, 1957. There were 13,048 air-transport movements at London Airport, a decrease of 3% compared with July last year and 432,747 passengers were handled, a decrease of 1%. Airports in the London area as a whole showed an increase of 5% in air transport movements and 4% in passengers.

SOUTH AMERICA AGAIN.—B.O.A.C was due to resume flights to South America on October 16 with a service from London to Carácas, Venezuela. Using Britannia 312s it will be operated twice weekly as an extension of the London-Trinidad service. This is the first time that B.O.A.C. has operated from Britain to Venezuela.

MORE TURBOJET ORDERS.—S.A.S. has ordered four more S.A. Caravelles, making a total of 16. At the same time Swissair has ordered five Convair 880s for delivery in 1960. The purchases are part of a co-operative arrangement between the two carriers which is explained on page 581.

BRITANNIA CHARTER.—B.O.A.C. and East African Airways have concluded a new partnership agreement whereby Britannia 312s are available to E.A.A. on a charter basis. With these aircraft E.A.A. inaugurated services between East Africa and the U.K. on October 8; hitherto Argonauts were used. The new service is flown once weekly in each direction between London and Nairobi via Rome, Khartoum and Entebbe; it is extended once fortnightly to Dar es Salaam. The arrangement will continue until E.A.A.C. takes delivery of two Comet 4s in 1960.

DUBLIN-BOSTON. — Irish Airlines (Aerlinte Eireann) inaugurated a new service from Dublin to Boston, Mass., on October 8. Using Super Constellations there will be two flights each way per week during the winter.

News About People

SENIOR POSTING. — Air Vice-Marshal R. B. Lees, C.B., C.B.E., D.F.C., has been appointed Senior Air Staff Officer, Fighter Command, in succession to Air Vice-Marshal D. R. Evans, C.B., C.B.E., D.F.C. Air Vice-Marshal Lees has been Assistant Chief of the Air Staff (Operations) since September, 1955, having previously been A.O.C., No. 83 Group, 2nd T.A.F., for three years from September, 1952.

ALUMINIUM MOVES.—Mr. E. A. Langham resident representative of the British Aluminium Co., Ltd., in Australia, is returning to the U.K. early next year, and will be succeeded by Mr. G. A. Daniels. Mr. J. W. G. Emery, at present Malayan area representative, will become Pacific area representative.

NAPIER POSTS.—D. Napier and Son, Ltd., recently announced the following three appointments: Mr. W. E. Hampton, A.F.R.Ae.S., as deputy commercial manager (Aviation), Gp. Capt. M. Lowe, C.B.E., as aviation sales manager (U.K. and Europe), and Mr. A. G. Shove, A.F.R.Ae.S., as aviation sales manager (overseas).

AVRO GROUP.—Seen at Chadderton on October 3 are, left to right, P. L. Sutcliffe (chief aerodynamicist); R. H. Francis (chief engineer, Weapons Research Division); S. D. Davies; J. A. R. Kay (general manager); Dr. W. Cawood (Deputy Controller, Aircraft Research and Development, M.o.S.), and J. R. Ewans (chief designer).

QANTAS POST.—Capt. L. R. Ambrose has arrived in London to take up his appointment as general manager (U.K. and Europe) of Qantas Empire Airways.

MR. GEOFFREY PARKER.—We are sorry to record that Mr. G. F. W. Parker, Middle East manager of B.O.A.C., was killed when the Auster he was piloting crashed on October 6. He was 45. The other occupant of the aircraft was also killed.

QUESADA APPOINTED.—Mr. E. R. Quesada, President Eisenhower's special assistant in aviation matters, has been appointed by him to be head of the new Federal Aviation Agency as from November 1. (In last week's issue an error in transcription resulted in an opposite indication.) The F.A.A. will come into being 60 days afterwards to give effect to the new Federal Aviation Act. The Agency will, according to *Aviation Daily*, take over the C.A.A., the Airways Modernization Board and the air-safety rule-making work of the C.A.B. The appointment is a civil one and Mr. Quesada will resign his retired status as a Lt.-Gen. in the U.S.A.F.

HAWKER SIDDELEY P.R.O.—Brig. L. L. Cross, C.B.E., has been appointed public relations officer to the Hawker Siddeley Group. His duties will include advising the board on public relations and advertising policies and co-ordinating such policies within the Group and its member companies. Brig. Cross, who is retiring from the Army, was Deputy Director of Public Relations at the War Office from 1946 to 1950, and since then has been at SHAPE, in Paris, first as Deputy Chief of Public Information and, from 1954, as Chief of Public Information.

SALES MANAGER.—Charles Butler Associates have appointed Mr. J. F. M. Brackley as sales manager.

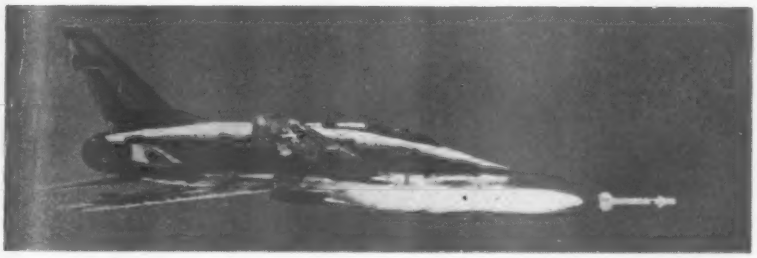
CIBA APPOINTMENT.—Mr. R. F. Webb, B.Sc., Ph.D., formerly a lecturer in Natural Sciences at Cambridge University and a Fellow of Trinity Hall, Cambridge, has joined the staff of CIBA (A.R.L.), Ltd., Duxford, where he will direct the activities of a number of specialist groups engaged in long-term research in new plastics materials.

CHANNEL WING NEWS.—Mr. J. W. Frazer, former president of the Kaiser-Frazer Corpn., and Mr. Willard R. Custer, inventor of the Custer Channel Wing Aircraft, have joined to form the Custer-Frazer Corpn. This corporation will handle the manufacture, licensing and sales of the Custer Channel Wing throughout the World.

A LIFE IN THE INDUSTRY.—When he retired on September 30, Mr. John Johnston, design office manager of de Havilland's Airspeed Division, could look back on nearly 48 years spent—except for a four-year period after the First World War—entirely in the service of the aircraft industry. He was one of five draughtsmen working in 1911 on Vickers' first aircraft; he flew with Sir Geoffrey de Havilland in the original B.E.2 in 1912 when he was at Farnborough; and, after a period with Bristol, was later engaged at the Royal Aircraft Factory on the design of the various F.E., R.E. and S.E. aircraft. He joined Airspeed at Portsmouth as chief draughtsman in 1939 and in this capacity he was later to see the Ambassador/Elizabethan through its development and into service with B.E.A. He had been design office manager at Christchurch since 1951.

PIONEER RETIRES.—Mr. J. Johnston, whose retirement from aviation is noted below.

Military Aviation Affairs



MISSILE CARRIER—1.—The F-100 Super Sabre—seen firing a Sidewinder air-to-air missile—is one of the U.S.A.F.'s day fighters for which this naval-developed weapon has been adopted.

FAST CROSSING. — A R.C.A.F. Comet 1a crossed the Atlantic on October 8 in 3 hr. 36 min., at an average speed of 550 m.p.h. It set course for Gander at 03.48 hrs. G.M.T. and arrived overhead Shannon at 07.24 hrs., a distance of about 2,000 miles.

U.S. CARRIER FACTS. — Seventeen operational carriers of the U.S. Navy are now equipped with the angled deck and the mirror landing aid, and 13 are fitted with the steam catapult. According to figures now available, the angled deck plus the mirror has reduced the U.S. carrier landing accident rate from 30 to 8 per 10,000 touchdowns, a saving of 300 accidents per year—about $50 million.

SCIMITAR FOUND.—The wreckage of an aircraft found some miles off the Isle of Wight on October 8 has been identified as that of the Scimitar in which Cdr. J. D. Russell lost his life on September 25. It crashed into the sea after a landing mishap on H.M.S. "Victorious."

JAPANESE SIDEWINDERS. — The American Defense Board has announced that Japanese air-defence units are to be equipped with Sidewinder infra-red homing air-to-air missiles in the near future.

SUPER PREPAREDNESS. — R. Swedish A.F. fighters practised "super-preparedness" for the first time during manœvres in central Sweden and over the Baltic recently. This action involves the pilots awaiting scramble orders with their engines started, the aircraft fuel tanks being continuously filled with fresh supplies from mobile tanks. On scrambling, the fuel hoses are pulled out and the tank connections locked.

MAGISTER ORDER.—Eight Potez-Air Fouga CM.170 Magisters have been ordered for the Finnish Air Force. Another 22 are to be built under licence.

U.S. DEFENCE SPENDING.—Estimated expenditure of the U.S. Defense Department will increase from £13,900 million in the fiscal year 1958 to about £14,600 million in the fiscal year 1959. Despite this overall increase the spending on aircraft and missiles will be lower, at £3,890 million, in 1959 as compared with £4,000 million in 1958.

MORE MAGISTERS.—The Belgian Air Force placed an order with the Potez-Air Fouga Co. on September 23 for 45 CM.170 Magister trainers (two Turboméca Marboré II turbojets). This followed the announcement that the advanced training of Belgian and Dutch Air Force pilots would be effected together under the NATO programme at a training base in the Belgian Congo. The Air-Fouga company was incorporated in the Potez group in May of this year.

SWISS DRAKENS?—The Saab-35 Draken single-seat supersonic all-weather fighter (licence-built Rolls-Royce Avon turbojet with Swedish-designed afterburner) returned to Linköping on September 22 after a two-weeks' test programme in Switzerland. It demonstrated its ability to operate from small airfields and to manœuvre in valleys. No decision has yet been made about a Swiss order for the Draken; other types are to be assessed.

MISSILE BASE.—An ICBM base is to be built at Forbes A.F.B., Kansas, by the U.S.A.F. This is the sixth base of its kind known to be planned in the U.S. It is expected that several Convair Atlas bases will be operational next year.

F.A.A. REUNION.—The Fleet Air Arm Reunion which was to be held at the Royal Albert Hall in London on December 1 has been postponed. No alternative date has yet been arranged.

MISSILE CARRIER—2.—The latest U.S. naval fighter to be equipped with Raytheon Sparrow III radar-homing air-to-air missiles is the McDonnell F4H-1 two-seat all-weather aircraft.

Air Transport

Rules for the Turbojets

SEVEN years after the Port of New York Authority had taken a firm stand in the matter of the likely noise problems posed by turbine-engined aircraft—and, in particular, of turbojet aircraft—the Authority has published its rulings for the operation of the Comet 4 and the 707-120 out of New York International Airport, Idlewild. The publication of these rulings coincided with the preliminary scheduled services by the Comet on October 4 and followed a noise investigation exercise which has cost the Authority many hundreds of thousands of dollars and a great deal of hard discussion.

The rules laid down for the two turbojet aircraft are stringent, but they can be met—and the impression with which one is left after talks with P.N.Y.A. executives is that, far from any prospect of a climb-down, there is still quite a possibility that the rules may need to be tightened still more. The simple fact is that the Authority, which operates the three main metropolitan airports (New York International, La Guardia and Newark, New Jersey), is very hard-pressed by community problems and has already had at least two tussles.

The situation can, perhaps, best be explained by visualizing New York International as being at the end of a peninsula lapped on three sides by residential or built-up areas; only towards the south-west can take-offs be made without involving climb-outs over these areas. In that direction lies Jamaica Bay and the Atlantic Ocean.

The Authority had laid out the instrument runway at Idlewild (as at La Guardia and, more recently, at Newark) in such a direction that, after the take-off and on the approach, no aircraft would normally pass over Manhattan. At Idlewild, fortunately, this runway orientation (04/22) lies more or less towards the "open" end of the peninsula (though a small turn to the right is necessary) and another runway (07R/25L), which crosses it diagonally, is even more conveniently placed.

This runway, in fact, is being extended at the north-east end and will, by the end of March next year, have a total length of 10,000 ft.; it will, presumably, become the main instrument runway for the airport. Meanwhile, the airport's longest runway (13R/31L), though aligned across our imaginary peninsula, is also being extended from its present 9,500 ft. to 11,000 ft. at its south-east end.

Operating Procedures

In simplest terms, the rules for turbojet operations are that, wherever possible, take-offs shall be made from runways 25 and 22—i.e., towards Jamaica Bay and the open sea—and that these, and only these, shall be used between the hours of 22.00 and 07.00. During the remainder of the 24 hours (the "waking" period) other specific take-off directions can be used provided that certain techniques are applied to reduce annoyance for the nearby communities. When operating conditions permit, therefore, a take-off towards water is mandatory.

The rules as agreed for the Comet 4 are as follow:—

(1) Runway 25 will be used as a mandatory preferential runway for take-offs in zero wind conditions and for all wind conditions which will produce a headwind component during take-offs on this runway, provided that the crosswind component does not exceed 20 knots.

(2) Runway 22 may be used for take-offs in lieu of Runway 25, in which case the pilot will make a right turn as soon as practicable after take-off sufficient to avoid flying over the communities which are in direct line with the runway.

(3) When take-offs cannot be made on Runways 25 or 22 in the above conditions, then, and only in that event, Runways 13R/31L (the longest runway) and 07 (the reciprocal of 25) will be used in the following conditions:

(a) For take-offs on Runway 13R, the pilot will make a turn to the right as soon after take-off as practicable, such a turn to be made with approximately 15° of bank. In addition, taking into account wind and temperature conditions, take-offs from Runway 13R will be so planned and conducted that the aircraft will not fly over any community underlying the flight path at an altitude of less than 1,200 ft. and the pilot will observe the procedures set forth in (5) below.

(b) Take-offs on Runway 31L will be so planned and conducted, taking into account wind and temperature conditions, that the aircraft will not fly over any community underlying the flight path at an altitude of less than 1,200 ft. and the pilot will observe the piloting procedures set forth in (5) below.

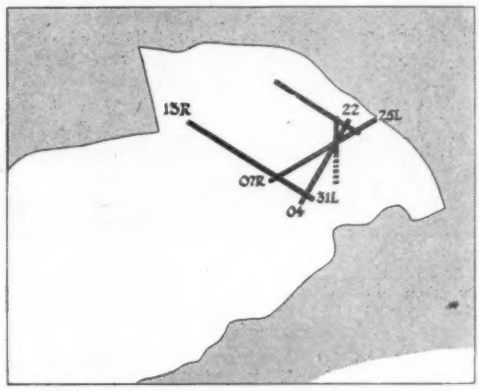
(c) For take-offs on Runway 07, the pilot will make a turn to the right as soon after take-off as practicable, such turn to be made with approximately 15° bank. In addition, taking into account wind and temperature conditions, take-offs from Runway 07 will be so planned and conducted that the aircraft will not fly over any community underlying the flight path at an altitude of less than 1,200 ft. and the pilot will observe the piloting procedures set forth in (5) below.

(4) No take-offs will be made on any other runways without specific permission.

(5) All take-offs in (3) (a), (b) and (c) above will be made using the following piloting procedures:—

Initial take-off will be made with a power setting of 8,000 r.p.m. and 20° of flap. Aircraft will be allowed to accelerate to V_2/+15 knots during climb, and the pilot will maintain this speed to the best of his ability until he has reached the communities adjoining the airport. Just prior to, or upon reaching the nearer boundaries of communities adjacent to the airport the pilot will effect a power reduction to 7,350 r.p.m.

(6) Take-offs during the hours between 22.00 hrs. and 07.00 hrs. will be made on Runways 25 or 22 only.



This simplified drawing shows (tinted) the approximate relationship of the built-up areas to Idlewild and the orientation of the runways used by the turbojets

These rules are, in general, also applicable to the 707-120, but there will be variations in the agreed techniques for the 707 to meet its particular characteristics and limitations. The Comet, with its lower wing- and power-loading, can normally, when using take-off power and held at V_2/+15 knots, reach the stipulated 1,200 ft. at or about the end of a runway; with its higher loadings the 707-120 may not always be able to meet the 1,200 ft. altitude stipulation and may, therefore, be more restricted in weight or take-off direction.

According to the P.N.Y.A., it will be possible for about half the turbojet take-offs to be made towards open water. The others will, as already explained, pass over built-up areas and will involve a power cut-back after reaching the minimum permissible altitude.

Some idea of the amount of work involved in the development of these rulings can be seen in the reports on the noise characteristics of the 707 and Comet 4 produced by Bolt Beranek and Newman, the acoustic engineers, of Cambridge, Mass. Each study is an inch or more thick and together would involve a $30 air-mail charge over the Atlantic. No doubt their size and weight will give comfort to the communities which have been protected by the P.N.Y.A.—but they are packed, too, with very valuable comparative information.

In particular, the studies have been concerned not only with noise-levels and frequencies in a directly scientific sense, but with those which are of human importance. To this end the engineers concerned have developed new "measures" of clamour—the "perceived noise level" (PNL) and the "perceived noise decibel" (PNdb). If these reports provide the specialists with a new approach to the problems of noise the effort will not have been wasted.—H.A.T.

BOEINGS FOR P.A.A.—In September Pan American World Airways took delivery of its second Boeing 707, which is seen here in the centre of the pre-flight line at the manufacturers' new commercial delivery base. On each side of it is a 707 — also for P.A.A. — awaiting delivery. The airline is to begin operations over the Atlantic with this type on October 26.

Trans-Australia Results

AN operating profit of £A282,702 is disclosed in the annual report of Trans-Australia Airlines, tabled in the Australian Parliament on September 23 by the Minister for Civil Aviation (Senator Paltridge). Revenue from all sources rose 8.2% to £A11,581,113. Profit of £A282,702 is down on the figure for the previous year (£A308,829) and is equal to a 6.5% return on average capital of £A4,370,000.

Cargo revenue was the highest yet recorded at £A1,701,755 despite strong competition from road transport and represented 14.7% of total revenue. Tourist-class services met with strong demand, carrying 53,314 passengers—79.6% more than in 1956-57, the first full year of tourist services.

Co-operation in Europe

TWO major European carriers, Scandinavian Airlines System and Swissair, announced last week an agreement whereby, following increases in their respective turbine fleets, there would be extensive exchange of equipment and technical co-operation. This announcement is of particular interest, following as it does the suggestions and recommendations of ICAO's Air Transport Committee and the proposed exchange of fleets between Pan American World Airways and National Airlines in the U.S.A. (see THE AEROPLANE, September 26, p. 489).

Swissair has ordered five Convair 880 medium-long-range turbojet transports for delivery late in 1960. S.A.S. has increased, from 12 to 16, its order for the short-medium-range Sud-Aviation Caravelle. Swissair will lease two of its 880s to S.A.S. for a period of four years, while S.A.S. will lease four Caravelles to Swissair from the summer of 1960 for a similar period. The Caravelles will be operated by both carriers on services in Europe and to the Middle East, and the Convair 880s on services to South America and the Far East. The Convair 880s will also be used by S.A.S. on services to South Africa and by Swissair on services to the Middle East.

Another important feature of the arrangements is that S.A.S. will overhaul all 10 Douglas DC-8 long-range turbojet transports which the two companies have, between them, on order —seven for S.A.S. and three for Swissair. In its turn, Swissair will overhaul the five Convair 880s and S.A.S. will look after the Caravelles.

All the DC-8s, Convair 880s and Caravelles will be standardized in terms of powerplants, accessories and equipment, and will, therefore, be interchangeable. S.A.S. has, incidentally, made an agreement with Sud-Aviation whereby the Caravelle's maximum take-off weight will be increased to 100,000 lb., permitting a working range, with full passenger load, of about 1,450 miles.

The agreement means that S.A.S. and Swissair will, from 1960, be able to operate, on a World-wide basis, a highly competitive fleet of 31 turbine transports and the mutual maintenance arrangements should mean lower operating costs.

B.E.A. Results

ALTHOUGH B.E.A.'s traffic results for July are in most respects less disappointing than those for June, the improvement is only one of degree. This was the tenth successive month in which load ton-miles sold failed to keep pace with capacity ton-miles offered. While capacity offered has been anything from 10 to 15% above that at the same time a year previously, traffic has been only 2 to 4% above the level for the previous year. The July results are tabulated below.

A small crumb of comfort for B.E.A. is to be found in the steadily increasing freight traffic. In the first four months of this year B.E.A. performed 13% more freight ton-miles than in the same period of 1957. At the present rate, freight revenue is about £1.9 million a year and should pass the £2 million per annum mark in a few months. This represents a doubling of freight revenue in about 3½ years. Progress has also been made in reducing the one-directional flow of freight; imports have been increased from 34 to 38% of the total in the past year. Rather more than two-thirds of all B.E.A. freight is carried in passenger aircraft, and the remainder on special freight services by Dakota and Viscount.

	July 1958	July 1957	Variation
Capacity Ton Miles offered ..	20,283,000	18,417,000	+10.1%
Load Ton Miles sold	12,606,000	12,047,000	+ 4.6%
Revenue Load Factor	62.2%	65.4%	— 4.9%
Passengers carried	360,742	362,435	— 0.5%
Passenger Miles flown	122,000,000	117,962,000	+ 3.4%
Passenger Load Factor	66.6%	72.7%	— 8.4%
Freight Ton Miles	897,370	799,800	+12.2%
Mail Ton Miles	317,800	274,300	+15.9%
Aircraft Miles flown	4,161,500	3,889,300	+ 7.0%
Revenue Hours flown	22,968	22,627	+ 3.1%

GERMAN EQUIPMENT.—The first Vickers Viscount 814 for Deutsche Lufthansa, D-ANUN, was handed over on October 5 and left London Airport the next morning for Germany. This picture was taken on a test flight shortly before delivery.

Prestwick Airport's Future

THE Ministry of Transport and Civil Aviation—now engaged on a final assessment of the physical and financial problems connected with the enlargement of Prestwick Airport—decline, writes a correspondent in Glasgow, to make any further prediction about how or when these problems are likely to be resolved. Local observers expect a decision within a month.

The scheme for which the Minister, Mr. Harold Watkinson, has gained approval in principle from his Government colleagues provides for the extension of the main runway from 7,500 ft. to about 9,500 ft., the extension and strengthening of taxi-ing tracks and the construction of new terminal buildings and aircraft parks.

One supplementary proposal, which has the full support of the Scottish Aerodromes Board and the Scottish Council (Development and Industry), envisaged the building of a road tunnel under the main runway and its associated taxi-ing tracks as an alternative to a long and inconvenient diversion of the existing main road.

Other proposals relate to the establishment of a special station for the airport on the Glasgow-Ayr railway line, the integration of airport-planning with the development plan for the burgh of Prestwick and the provision of facilities for feeder air services—possibly by the ultimate transfer of B.E.A.'s operational centre from Renfrew to Prestwick.

As at London Airport, for which an extension programme estimated to cost £17m. has been recommended, the policy is bound to be one of development by stages, and it is not yet known in either case whether a sum has been fixed to cover all approved work.

The Ministry's main object—as the Parliamentary Secretary, Mr. Airey Neave, reaffirmed recently during a second visit to the airfield in two months—is to have the extension of the main runway completed by the middle of 1960. The extra length, however, will have to be added at the seaward end and, in the new configuration of the airport, the existing terminal will constitute a hazard to traffic which cannot be accepted for any length of time under safety regulations.

An engineering survey of the whole area affected by the extensions was, our correspondent continues, ordered some time ago. The draft design which has been discussed with representatives of the local authorities locates the new terminal on the northern end of St. Cuthbert's golf course and adjacent to the railway. In order to fit in the requisite number of aircraft stands there—a number to be determined by estimating the probable growth of traffic during the next decade or more—the Ministry's engineers may need to produce a scheme as neat and intricate as that for London Airport.

The only other site convenient to both the main and secondary runways and to the road and rail systems is an area to the south of the existing terminal and adjoining the south-western end of the original (and now disused) secondary runway. Though that sector has been included in the present survey, the objections are obvious. Development there would involve setting the aircraft stands alongside the Prestwick High School and a considerable residential area—thereby creating an insupportable noise nuisance—and the plan might not be feasible without demolition of property.

N.Z. Private Enterprise

IN one of Wg. Cdr. Fred "Pop-Eye" Lucas' friendly, if rare, letters from Queenstown, in New Zealand's South Island, he gives news of his company, Southern Scenic Air-Services, Ltd. Their fleet is now four D.H.89s, three Cessna 180s, two Auster Aiglets, an Anson 12, a Proctor 5, and they have the hire of a privately owned Piper PA.22. Activities include scheduled services; top dressing; ambulance flying; dropping supplies, fencing, sectioned huts and rabbit-poison; charter and scenic flying.

West Coast Airways, Ltd., based at Hokitika, is a subsidiary company operating a D.H.89 schedule down to the glaciers and the Haast, where a road through the Alps is being built. This sector was bought from New Zealand National Airways Corporation some two years ago. And now Fred and his wife have just bought the local "pub," where they will accommodate hunters and fishermen who will be flown to the company's strips for their sport.—WREN.

ASIAN RENOVATION.—The terminal buildings at Colombo Airport, Ceylon, have been completely redesignd to cope with increasing air services, and the airport itself is being reconditioned. The official opening was on September 27.

Gryphon in the Sky

By J. S. Gillroy

THE GRYPHON of old guarded a legendary stream of gold in the North, but today's gryphon stands guard over the fortunes of a small but very lively aviation company which is rapidly spreading its wings over the whole World. It is the emblem of the French independent airline, Transports Aériens Intercontinentaux (T.A.I.).

T.A.I. was formed in the immediate post-War years at a time when the air transport industry was beginning to make its mark on the pages of modern history. Colonel Genain, T.A.I.'s founder, must certainly have had his own personal crystal ball tuned in to the future, for T.A.I.'s progress in all fields of its activities have been pleasing and gratifying to both the management and staff of this fledgling airline.

Since those eventful days in 1946 T.A.I. has made a profit in every year, and in the years from 1946 to 1956 increased its financial annual turnover by 129%, which is an achievement of which any company director can be proud.

When T.A.I.'s directors issued shares to be quoted on the official market of the Paris Stock Exchange they had the pleasure of seeing the shares of the only air-transport company quoted rise from a nominal issue rate of 2,500 francs per share to something like 8,000 francs per share in less than two years.

T.A.I. began operations with three-engined Junkers 52s and Bristol Freighters, then in 1947 the fleet was changed to Douglas DC-4s, which were used on the long-haul network until May, 1953, when they were replaced with DC-6Bs. The present fleet consists of three DC-7Cs, four DC-6Bs, one DC-6, two DC-4s and four DC-3s, and in keeping with the trends of this modern age T.A.I. has on order two Douglas DC-8s for delivery in early 1960.

From the beginning T.A.I. has not been content merely to idle along at a leisurely pace, but has made every effort to improve existing services to the public and to enlarge the fields of activities whenever such opportunities arose. Such a policy has paid dividends. In 1946 T.A.I.'s total flying hours were 2,180, and by the methods detailed above this had been increased to a total of 26,578 flying hours in 1956. For three years from May 29, 1953, T.A.I. held the World record for the longest distance to be flown non-stop by a commercial aircraft. On that May day a DC-6B bearing the green-and-white winged gryphon took off from Los Angeles and touched down at Orly, Paris, exactly 20 hr. 30 min. later. The T.A.I. crew flying this aircraft covered the 5,985 miles between these two cities by following the Polar route.

T.A.I. seems to have a passion for long distance. Once a week a DC-6B sets out from Paris to cover the Antipodes route. This route crosses Europe, stopping at Athens, and thence to Karachi, Saigon, Darwin, Brisbane, across the Pacific Ocean to Noumea, New Caledonia, and finally, after another ocean crossing, the aircraft comes to a halt at Auckland Airport, New Zealand. This picturesque route, which connects the civilizations and customs of seven different nationalities, is the longest route but one in the World to be operated without change of aircraft. The longest is another of T.A.I.'s. It covers the same route as far as Noumea and thence it branches off to Boro Boro, the closest airport to Papeete, Tahiti. From there passengers embark in a Sunderland flying-boat which connects with Papeete. Passengers on these two trips have the added enjoyment of a mid-air film screening.

From another viewpoint T.A.I. has also been among the World leaders through its approach to the technical aspect of operations. Since 1955 T.A.I. has been the World record holder for daily utilization of the DC-6B, a performance for which it was awarded the Douglas Aircraft Corporation's Medal of Honour. In 1956 T.A.I. bettered its own figures and achieved a total utilization figure of 11 hr. 33 min. average daily per aircraft.

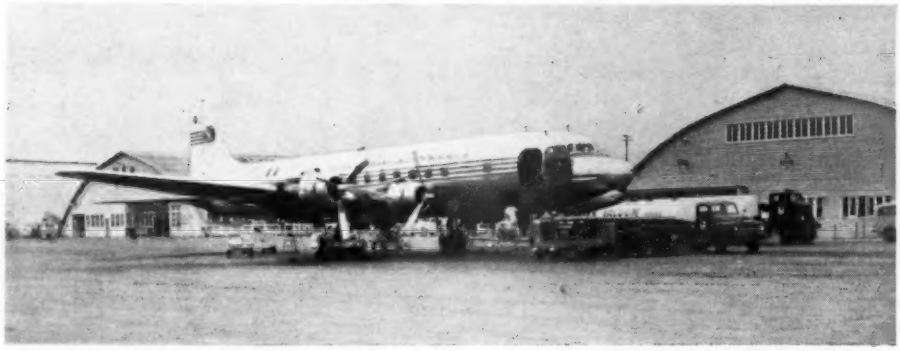
The standard of maintenance of T.A.I.'s workshop has been very high in the past and it was no surprise to those who knew of the standard when, in 1955, the U.S. Civil Aeronautics Administration certified the T.A.I. workshops as their official maintenance station at Orly. Since that year T.A.I. has also been entrusted with the maintenance of all MATS (Military Air Transport Service) aircraft calling at Orly.

MATS, which is a U.S. Government organization, is one of the largest air-transport systems in the World, and T.A.I. is justly proud of having been entrusted with the maintenance of its aircraft.

T.A.I.'s industrial plant is installed in an enormous hangar of revolutionary design at Orly. All the overhaul bays, test beds, laboratories and general offices of the technical services branch of the company are grouped in this one hangar, which is, of course, of an inestimable advantage to all concerned.

By a special arrangement with the French Government and the other two main French international airlines, T.A.I. is the official French flag airline operating in the area which covers the whole of the South Pacific. T.A.I. has plans to set up new international links with various points in this area in the very

COMING IN.—A T.A.I. DC-6B making an early-morning landing at Brisbane. The foreground will soon become part of a proposed new runway.



STANDING BY.—A Douglas DC-6B of T.A.I. is seen here by the overseas terminal at Eagle Farm Airport, Brisbane.

near future. The first steps have already been made towards the establishment of an air network in the French Oceania area. Based at Noumea, T.A.I. DC-3s provide services linking New Caledonia with the New Hebrides, Fiji and the Wallis Islands.

In May, 1957, the French Government authorized the construction of a new airport at Tahiti which, because of its strategic position in the centre of the South Pacific, will, when completed, become an important touch-down point for any future airline crossing the South Pacific. Aircraft will then be able to leave from picturesque Tahiti on the first leg of flights to the American continent. Naturally enough, T.A.I. is looking forward eagerly to the day when its aircraft takes off on the first hop to the Americas, thus completing the "Round the World with T.A.I." link.

T.A.I. places very high among its achievements several special flights, not the least of which were the charter flights which carried more than 300 athletes to the Olympic Games at Melbourne in 1956. Early in 1957 T.A.I. had the distinction of carrying the one hundred thousandth Hungarian refugee from Austria sent by the Intergovernmental Committee for European Migration. A picturesque occasion to which T.A.I. aircrew look forward is the annual Islamic pilgrimage to Mecca. Every year since 1947 T.A.I. has carried pilgrims to Jeddah, 45 miles from the Holy City of Mecca. One DC-4 was transformed into a "flying pig-sty" between Paris and Saigon, and another DC-4 was turned into a nursery garden of rubber plants between Saigon and Abidjan.

The pace has now been established; if T.A.I. can maintain its rate of progress we should be hearing a lot more of this airline in the years to come.

Good Design Sells Air Travel

THE business of B.E.A. was to work towards a state where air travel was within reach of everybody, a situation which they would bring about more rapidly than a common language could be taught to successive generations of travellers. For this reason the importance of visual design, as a language in its own right, was apparent, said Mr. A. J. Burkart, advertising manager of the Corporation, in an address to the Design and Industries Association at Manchester on October 2. The B.E.A. network extended down to the Persian Gulf and included 20 principal languages.

The existence of staff designers to brief outside designers insured that a true family resemblance was achieved in the visual manifestations of B.E.A. activity. How could one insure that B.E.A. was recognized as the same organization in Ankara as in Aberdeen, or in Madrid as in Manchester? They had produced a manual of design specifying basic standards and some of the mechanics of the design policy. Sufficient information was given visually to enable a Turkish sign-writer to prepare a B.E.A. sign in an accurate manner.

The Corporation believed that the creation of this important family resemblance in all their affairs promoted revenue and increased confidence.

They were faced with a large number of competitors on their routes and had a dozen or more challenges in the field of design. For B.E.A. purposes a journey started when the traveller's mind first considered his intended holiday or business trip and so extended in time for perhaps as much as nearly a year. Their passengers must be recognizably in their hands from their first plans until the completion of their travel some days, weeks, or months later, and what they recognized as B.E.A. must give them confidence.

The Nord Noratlas

ONE of the most successful transport aeroplanes designed in France since the War has been the Nord Noratlas, of which nearly 200 are at present in service with the French, Israeli and German air forces. Several civil versions of the Noratlas have also been produced and, in a small way, this aircraft has been doing a very good transportation job in parts of French North and West Africa.

Flying with Air Algérie, the Noratlas is used to carry personnel and stores for petroleum companies between Algiers and the Sahara. A fleet of seven is used by U.A.T. on scheduled services in West Africa, in a mixed passenger-cargo layout, and this airline carried 33,000 passengers and completed seven million ton/km. by Noratlas in 1957.

The Nord 2502, which is the type used by U.A.T., has recently been certificated in accordance with C.A.R. Part 4B at 50,700 lb. It is powered by two SNECMA-built Hercules engines and has Turboméca Marborés at the wing-tips. An alternative civil version, the Nord 2508, has Pratt & Whitney R-2800 engines plus the Marborés, and was successfully demonstrated last year in high, mountainous regions flying with the Indian local operator Kalinga.

For the record, we are printing here the latest available data for the Nord 2502, in our standard form.

NORD 2502

Dimensions
- Span: 110 ft. 2.8 in.
- Overall length: 72 ft. 0.5 in.
- Overall height: 19 ft. 10.5 in.
- Gross wing area: 1,090 sq. ft.
- Sweepback: Nil.
- Internal cabin dimensions:
  - Length (ex. flight deck): 32 ft. 5 in.
  - Max. width: 108 in.
  - Max. height: 94.5 in.
  - Max. usable floor area (ex. flight deck): 233.6 sq. ft.
  - Max. usable volume ex. flight deck): 1,800 cu. ft.

Accommodation
- Normal tourist: 36.
- Max. coach: 45.
- Volume of freight hold: 71 cu.

Powerplants
- Two SNECMA–Bristol Hercules 758/759.
- Take-off power each (I.S.A., s.l.): 2,040 b.h.p. at 2,800 r.p.m. and two Turboméca Marboré II turbojets at wing-tips.
- Take-off power each (I.S.A., s.l.): 880 lb.
- Breguet BR.3 (Rotol-licence) 14-ft. diameter 4-blade propellers.

Weights and Loadings
- Basic operational: 30,080 lb.
- Total fuel: 8,080 lb.
- Mfrs. max. payload: 16,640 lb.
- Max. take-off: 50,700 lb.
- Max. landing: 48,500 lb.
- Max. zero fuel: 46,720 lb.
- Wing loading (max. t-o. wt.): 46.54 lb./sq. ft.
- Wing loading (max. landing wt.): 44.52 lb./sq. ft.
- Power loading (max. t-o. wt.): 12.42 lb./h.p.

Design Criteria
- Design limits: Vc=189k. VNE=225k. VD=250k.

Performance
- Recommended cont. cruising speed (I.S.A.): 172 knots T.A.S. (at 10,000 ft. and 49,000 lb.); consumption: 123 Imp. gal./hr.; power (per engine): 940 b.h.p.
- Approach speed (at max. landing wt.): 102 knots.
- Balanced field lengths (at max. t-o. wt.): At I.S.A. at sea level: 4,900 ft. At I.S.A. +15°C at sea level: 5,550 ft. At I.S.A. at 5,000 ft.: 5,900 ft.
- Landing distance from 50 ft. (unfactored, max. landing wt.): 3,000 ft.
- Range (take-off to landing), still air, no reserves, I.S.A., max. fuel (1,120 Imp. gal.): 1,484 naut. mi. with 12,710 lb. payload at 172 knots (mean) at 10,000 ft. (mean).
- Range (take-off to landing) still air, no reserves, I.S.A., with max. payload 685 naut. mi.

The Fighting Services

Brookwood Memorial Unveiling

H.M. THE QUEEN is to unveil the Brookwood Memorial in Brookwood Military Cemetery, near Woking, on October 25. It commemorates 3,500 personnel of the Commonwealth land forces who died at sea in raids and missions mounted from the United Kingdom, or on active service outside the main theatres of war. At the ceremony some R.A.F. officers who were concerned with such operations will be among the special guests. In addition, the R.A.F. will be represented by an officer and 20 men of the Ceremonial Drill Unit, Uxbridge, and cadets from the R.A.F. College, Cranwell, and the R.A.F. Technical College, Henlow, will be among the route-lining personnel.

The Air Council will be represented by Air Marshal Sir John R. Whitley, Air Member for Personnel, who will lay a wreath from the Air Council and all ranks of the R.A.F.

Officers concerned with some of the operations who will attend will include Air Chief Marshal Sir James Robb and Air Vice-Marshal Sir Geoffrey Bromet. Sir Geoffrey, representing the R.A.F. Association, will lay a wreath. The special guests will include Marshal of the Royal Air Force Sir William Dickson, Chief of the Defence Staff. As its Controller, Air Vice-Marshal Sir John Cordingly, will represent the R.A.F. Benevolent Fund, while Air Chief Marshal Sir Arthur Longmore, will attend as a Commissioner of the Imperial War Graves Commission.

New Missile Tradés

FIVE new advanced trades, mainly in technician ranks, have been formed in the R.A.F. following the introduction into the Service of ballistic missiles, and the recent delivery from the United States of the first Thor IRBM. Designed to deal separately with the system, control, guidance, propulsion and test equipment aspects of IRBM servicing, the trades are in the electrical and instrument engineering trade group.

The trades, to be known as Missile Fitter (System), etc., and Missile Test Equipment Fitter, will be open to technicians and N.C.O.s in certain advanced trades, who will be given conversion training courses in the United States.

Gordon Shephard Awards

IN his second attempt, Sqn. Ldr. E. J. Baker, an equipment officer at the Air Ministry, has won the 1958 Gordon Shephard Memorial Prize Essay Competition. Sqn. Ldr. G. C. T. Richards, an education officer at Headquarters, Flying Training Command, was second; Wg. Cdr. J. H. F. Ford, D.F.C., officer commanding the Cambridge University Air Squadron, was third, with Wg. Cdr. J. F. Powell, O.B.E., of the R.A.F. College, Cranwell, fourth.

A feature of this year's contest was the fact that essays from three airmen were among the final nine judged. Seventy-one essays were received, and the standard was such that a fourth prize was awarded. The competition originated in 1918 with Sir Horatio Hale Shephard forming a trust in memory of his son, the income to be at the disposal of the Air Council for the annual provision of essay prizes, which this year were 50, 30, 20 and 10 guineas respectively.

R.A.A.F. Antarctic Detachment

FOR a number of years the R.A.A.F. has maintained a party of pilots and ground staff personnel with the Australian National Antarctic Research Expedition (ANARE), and Sqn. Ldr. J. C. Sandercock is to lead the 1958-9 party when it goes to Antarctica in December. Operating the ANARE's two D.H. Beavers, the R.A.A.F. party winters there and returns with one of the two aircraft, which is replaced by a third Beaver from Australia.

The successive R.A.A.F. Antarctic flights which have served in Antarctica, flying Beavers and Austers, have flown more than 1,500 hr. under the most trying conditions. Based at Mawson, their aircraft maintain a flying organization to carry supplies to forward parties, to transport scientists, and in general operate air transport for the expedition. The work of the R.A.A.F. Antarctic flight was described in THE AEROPLANE of March 7, 1958.

R.A.F. Appointments

THE following are among recent Royal Air Force appointments:—

Wing Commanders: R. J. Bartlett to R.A.F. Nicosia for technical duties; W. L. Farquharson, D.F.C., to Headquarters, F.E.A.F., for staff duties; R. W. Jeary to Home Command as Regional Recruiting Officer, Kenley; W. T. Mathieson to the R.A.F. Technical College, Henlow, for staff duties; L. C. J. Smith, O.B.E., to R.A.F. Locking for administrative duties; N. W. Turner to Air Ministry for duty in the Department of the Air Member for Supply and Organization.

Squadron Leaders: P. D. Bird to Air Ministry for duty in the Department of the Air Member for Supply and Organization (with acting rank of Wg. Cdr.); J. P. Spillane to Headquarters, Bomber Command, for technical staff duties (with acting rank of Wg. Cdr.); A. F. Wilson, D.F.C., to Headquarters, Allied Air Forces, Northern Europe, for staff duties (with acting rank of Wg. Cdr.).

Reunions

Handley Page Squadron's Association.—The annual reunion dinner of the 1914-18, 7 and 14 R.N.A.S. and R.A.F. Handley Page Squadron's Association is to be held at the Horse Shoe Hotel, Tottenham Court Road, London, W.C.1, on October 25. Details from the Hon. Sec., Mr. G. Conley, 62 Nightingale Lane, London, S.W.12.

Directorate of Catering.—The first reunion dinner of the R.A.F. catering organization since its rise to Directorate status is to be held at 18.00 hrs. in the Windsor Room at the Corner House, Coventry Street, London, W.1, on October 20. Dress will be informal.

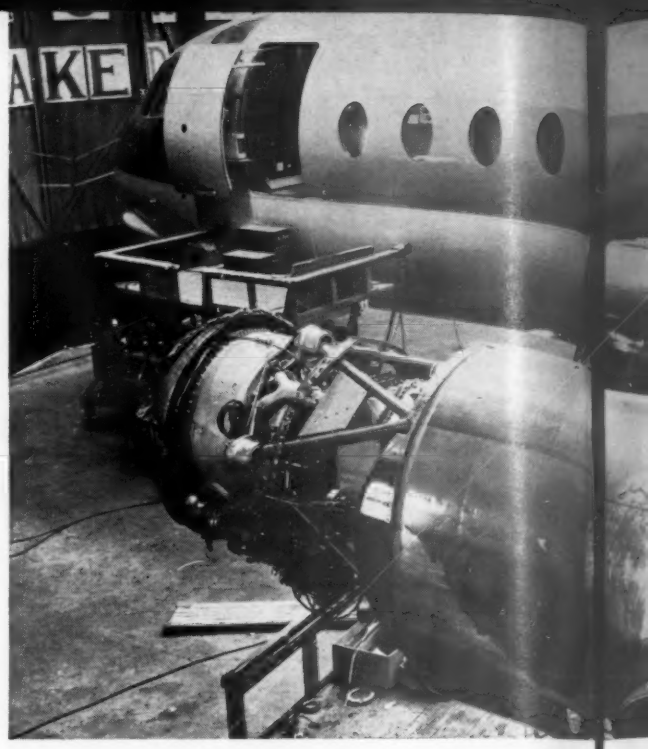
SERVICE TRIALS.—De Havilland Sea Vixen FAW.1s are due to be delivered to No. 700 "Y" Flight forming at R.N.A.S. Yeovilton for intensive flying and working-up trials before the end of this year. This particular Sea Vixen is carrying four Firestreak AAMs and two 150-gallon drop tanks.

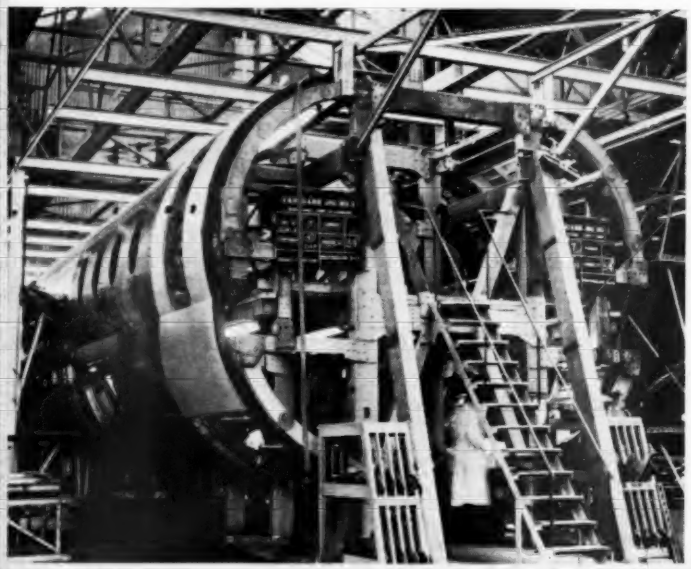
Photograph copyright "The Aeroplane"

VANGUARDS IN PRODUCTION

FIRM FAITH in the turboprop-powered commercial transport, backed by the enormous and World-wide success of the Viscount, is behind the production by Vickers-Armstrongs (Aircraft), Ltd., of the Vanguard at Weybridge. The Vanguard, to be powered by four Rolls-Royce Tyne two-spool turboprops, is on order from British European Airways and Trans-Canada Air Lines.

Whereas the Viscount was an excellent example of an orthodox airframe with an entirely new type of engine, the Vanguard combines the latest in turboprops with an advanced airframe structure incorporating multiple load-paths and designed for a very long fatigue life.





The production line is the scene of constant activity and the tempo increases as the first flight date approaches. The first aircraft began to take complete shape some time ago (THE AEROPLANE, July 4) and is now in the process of having the Tyne engines installed, for which a rack of de Havilland 14 ft. 6 in. diameter propellers is ready.

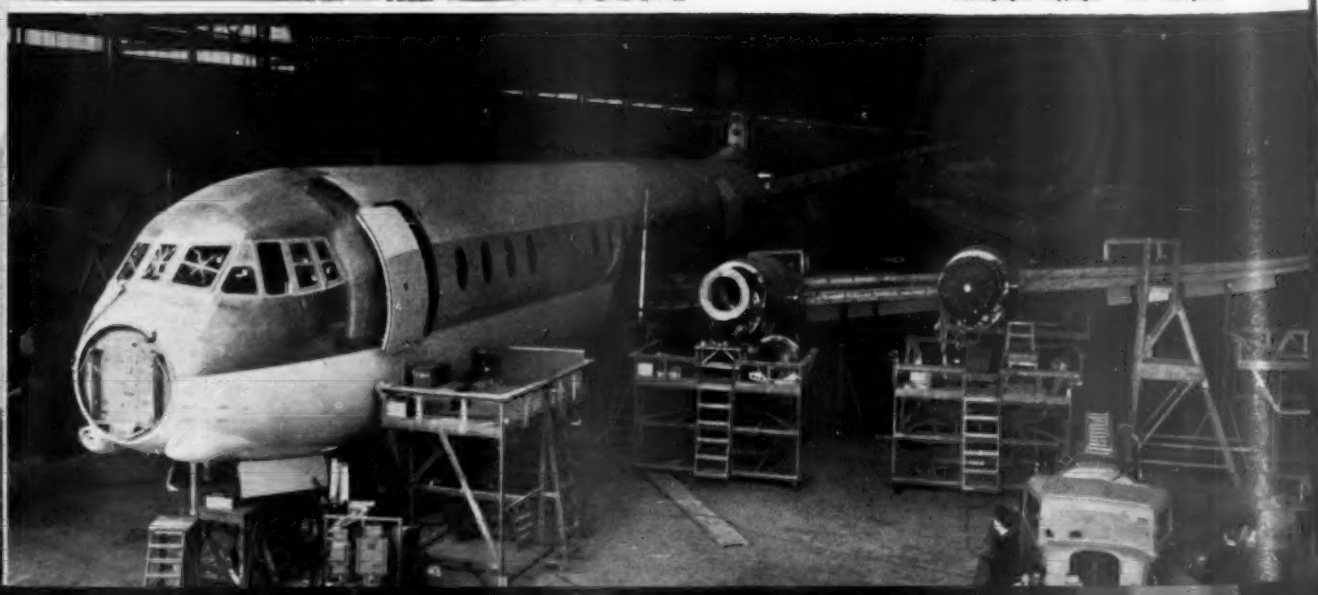
Some idea of the production picture can be gained by running through the major sub-assemblies and systems. Five wing centre-section torsion boxes had been finished by the beginning of this month, in addition to a test set, and the sixth will be ready by the end of October.

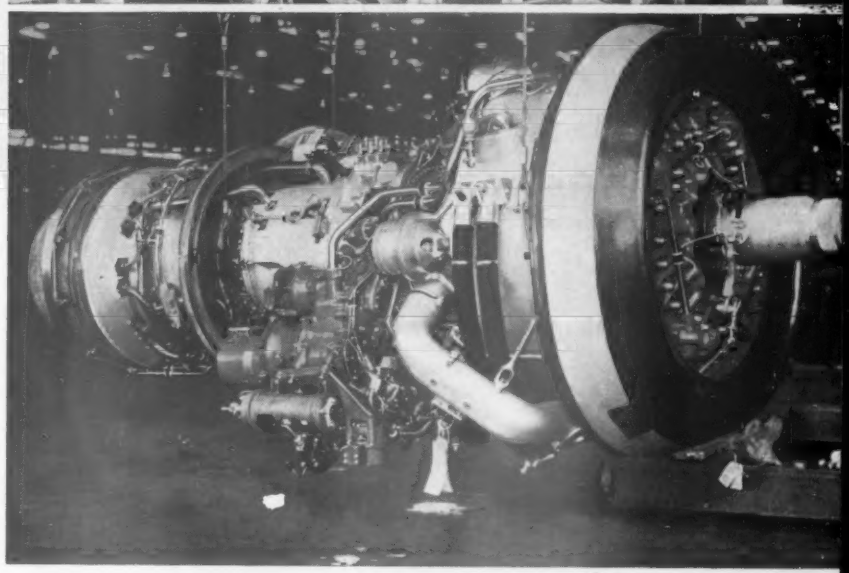
Three sets of main-wing torsion boxes are out of the jigs, the fourth is due out on November 11 and the fifth by December 5. The fourth set of centre-fuselage components is finished and so are the appropriate tail and front fuselage sections and windscreen-hood assemblies. The fourth rear fuselage is due at the end of the month.

The third production set of tailplane parts and the second sets of elevators, fin and rudder are all ready. The third set of elevators should be available by the end of this month. Of the undercarriage, the third set of nosewheel chassis is complete.

Left, fuselage sections for the Vanguard are built in two panels, divided on the vertical centre-line for ease of fabrication. This front fuselage is for the fourth B.E.A. aeroplane. The first B.E.A. Vanguard will be registered G-APEA.

Photographs copyright "The Aeroplane"





Above, double-bubble fuselage contours are a prominent feature of the Vanguard, a very large freight stowage volume being available under the passenger cabin. The first Tyne engine is seen installed in the port outer mounting.

Top right, wing torsion boxes for the Vanguard are formed by three vertical shear webs and integrally stiffened panels on the upper and lower surfaces.

Right, powerplant of the Vanguard is four Rolls-Royce Tyne R.Ty.1 two-spool turbo-prop engines each of 4,985 e.h.p. In cruising flight the Tyne has the very low specific fuel consumption of 0.388 lb./e.h.p./hr.

the fourth is well under way and the fifth is now building. The third set of main chassis is complete.

Coming now to flaps and ailerons, the third set of flaps is built and the second set of ailerons is expected towards the end of the month. The third sets each of aileron and flap shrouds are finished.

A second set of engine nacelles (built by Fairey Aviation) is ready and a third set is expected by the end of October. The first complete set of Tyne engines is due within a fortnight from now. As noted above, the de Havilland propellers are already available.

Turning to the all-important aircraft systems and services, the electrical system of the first Vanguard should be complete before the date of this issue, with full power on the bus bars available for testing. It is worth noting in this context that there are in all about 480 electrical circuits to be tested, about half of which had been checked by the beginning of this month. A special test-set has been produced for checking functioning of components in the heavy-duty circuits.

For the second aircraft, sub-assemblies for the electrics bay are ready and roof panels are being worked on to clear certain snags.

Instrumentation and the associated calibration is a long job, but this should be completed on the first aircraft by the end of the month. All wiring looms have been laid in the airframe and at the time of a recent visit we saw the banks of terminal blocks being wired up in the fuselage to connect with flight-observer recording instrumentation. Further sets of equipment are well under way.

Radio installation in the first aircraft is complete except for the Smiths Flight System which is being installed. All other radio equipment is being tested in the aircraft. The second set of radio crates is being wired up.

Push-pull primary control circuits are in place in the first Vanguard and so are the cable trim circuits. The complete system should be cleared of snags and functioning by today. The second aircraft set of control circuitry is well under way and should be installed in the second aircraft by the third week of this month.

Engine controls are virtually complete and are being connected to the engines and adjusted as they are installed. The second throttle box is nearly ready and so are all associated smaller components, control rod runs and so on.

Emergency brakes and parking-brake controls, the free-fall undercarriage chassis system and the aileron anti-upfloat system are in the first aircraft.

Installation of the first fuel system is well advanced, complete with flow-meters. Flow-testing, calibration of gauging and all fuel checks should be finished by today. The first hydraulic system is finished and functional testing has begun.

Within a few days all components of the pressurization system will have been checked and the second set will be ready within a week from now. An oxygen system is being installed in the passenger cabin of the first aircraft for the flight test-observers and is being connected to the flight deck system already installed. The flap system, complete with torque shafts, nylon-covered cables and drums, should by now be fitted and cleared for operation.

No firm date can yet be quoted for first flight of the Vanguard (G-AOYW), but it will certainly be some weeks before the end of the year.

Left, nearing completion, the first Vanguard (Vickers owned) on the line at Weybridge is due to fly later this year. It is on order for British European Airways and Trans-Canada Air Lines. The small ram air intakes under the nose are for the air-conditioning intercoolers.

Missile Development at Valley

This report, by JOHN FRICKER, *describes the work of the R.A.F.'s first Guided Missiles Development Squadron.*

ALTHOUGH no operational air-to-air guided weapons are yet in squadron service with the R.A.F., Fighter Command has almost completed intensive development trials with a large number of Fairey Fireflash beam-riding missiles to gain a broad background of experience, and the Central Fighter Establishment at West Raynham is already conducting tactical trials with the more advanced de Havilland Firestreak weapons system. When the Guided Missiles Development Squadron at Valley, Anglesey, finishes its Fireflash programme in December, its Swift Mk. 7s will be replaced by Javelins, and the entire effort will switch to the infra-red homing Firestreak.

Most of the remaining Fireflashes of the considerable number built will then pass from Fighter to Technical Training Command, where their complicated and miniaturized electronic systems, together with extensive test facilities, will be invaluable for the instruction of technicians who will handle the later breeds of air-to-air weapons. So although the Fireflash was not destined to achieve operational status, it has fully justified its procurement by establishing a solid foundation for air-missile tactics and technology. This rests on the development of (a) command and direction, (b) airmanship, (c) technical skill and (d) analysis, which are common to all AAMs.

At the Missiles Development Squadron last week, tribute was paid to the Fireflash as "a very accurate weapon," and perhaps its only limitation is that of the beam-riding system itself, for air combat. After release, the missile must be gathered into the radar beam projected from the nose of the aircraft, and this must be continually aligned on the target via a radar gunsight if a hit or proximity-fused lethal burst is to be achieved.

This represents only a limited advance from fixed gunnery, whereas with an infra-red guidance system, for example, once the heat-seeking system has locked on and the missile has been released, it is completely independent of further action by the pilot. With the infra-red Sidewinder, Chinese Nationalist aircraft recently demonstrated a 70% kill factor against Communist MiGs and, as a later missile, the D.H. Firestreak may be expected to be even more effective.

Fireflash development began as long ago as 1950 and the first air firings of the original Blue Sky were in 1952. Development launchings were done by a unit at Woomera with a variety of aircraft, and this was the precursor of the squadron at Valley. The Guided Weapons Development Squadron was formed in April, 1957, and is commanded by Wg. Cdr. J. O. Dalley, D.F.M. Its afterburning Swifts were specially adapted by Supermarines to carry the Fireflash, having Ekco radar equipment installed in the extended nose, and two racks, with their associated wiring and relays, mounted beneath the wings.

Another feature of the Swift Mk. 7 is an 18-in. extension of each wing-tip, which means that the ailerons are now inset, for a further improvement of the handling qualities at high altitude. The Missile Development Squadron is the only unit to operate this mark of Swift, which has proved very satisfactory

(*Continued on page* 589)

1. The delicate central "dart" of the Fireflash is unpacked from its heavily padded container in the missile laboratory at Valley.

2. The compact guidance and control mechanism is removed for installation of the batteries.

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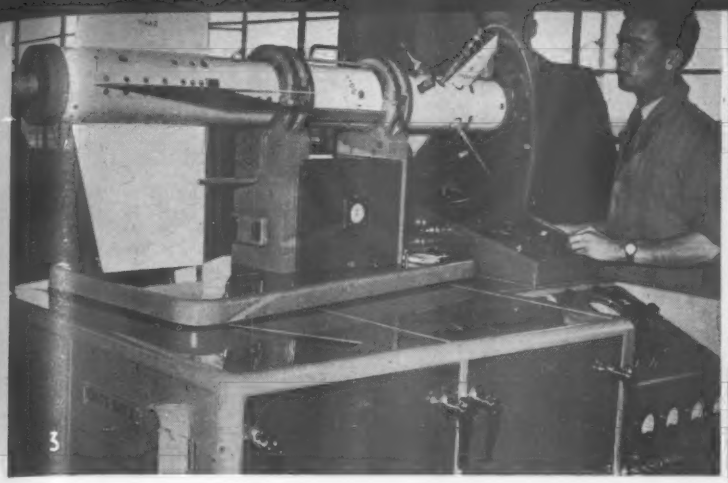


3. The outer casing having received its wings and control fins, the assembled afterbody is tested for response to simulated aerodynamic movement.

4. For development purposes, the Fireflashes have telemetry heads, which are checked after installation on the afterbody. The heads are fan-cooled during functional testing.

(*Continued from page* 588)

for these duties, but it also has several Meteor 7s and 14s, carrying cameras in modified nose fairings, for evaluating air firings of the Fireflash.

Most of the missile launchings are aimed at the Meteors or other aircraft flying just out of range of the Fireflash, and only on very rare occasions are live firings completed against pilotless "drone" targets. The standard telemetry head which relays detailed information back to ground stations for subsequent analysis may then be replaced by a lethal warhead, and a "kill" then becomes virtually guaranteed.

All Fireflash launchings by the Swifts take place on the Ministry of Supply range over the sea off Aberporth, Cardiganshire, under radar control from the ground, and when used the "drone" targets take-off from nearby Llanbedr. Whatever the target, the pilot is vectored on to it by normal GCI, using the classic "stern-chase" interception technique from a right-angled approach until a visual sighting is obtained. The target is maintained in the radar beam, which is harmonized with the gunsight, by the pilot keeping it in the centre of the graticule, and firing range is indicated by a warning light.

Air launchings off Aberporth were demonstrated last week in close proximity to an R.A.F. Hastings, which was provided as an aerial grandstand for the Press, and through the door of which the snarling thunder of the twin 5-in. booster rockets of the Fireflash could be clearly heard. The rockets burn for only 2 sec., but streak the Fireflash to more than M = 2 before being explosively jettisoned, leaving the central "dart" to coast at high speed along the radar beam towards the target.

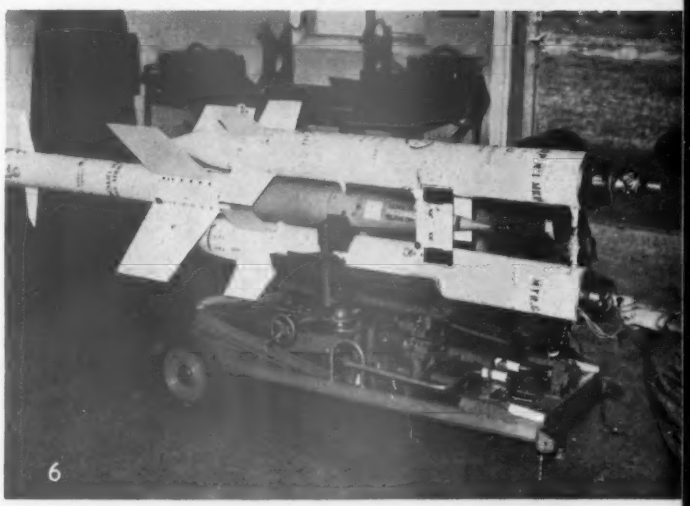
Acceleration of the two missiles launched was so rapid that they were out of sight before booster separation could be seen, and their final plunge into the sea at an unspecified range was also unmarked by human eye. Although not fired against a specific target, they provided an impressive spectacle of power and precision. When launched, according to the Swift pilots, they apparently impart a slight yaw to the aircraft, following the loss of their weight and drag, and it is necessary to recover them in the beam by a slight counter movement of the controls before continuing to track the target.

Fireflash firing is apparently no more difficult than normal aerial gunnery, although only specialist pilots have so far practised the technique in the Development Squadron. This unit will apparently not be used for training all fighter pilots in missile techniques, which will be undertaken at squadron level as with normal armament training. No special problems are anticipated.

During the practice launchings the utmost safety precautions are taken to prevent inadvertent firing over land, and priming of the Fireflash does not take place until the aircraft is over the sea, under ground control. Similar stringent safety precautions accompany the assembly, testing, loading and unloading of the weapons on the ground at Valley. Only personnel essential to the operation are allowed in the compound during the assembly and tests, which are completed in blast-proof shelters.

The 7-ft. 4-in. central "dart," carrying the warhead with proximity fuse or the telemetry head, arrives in a very large

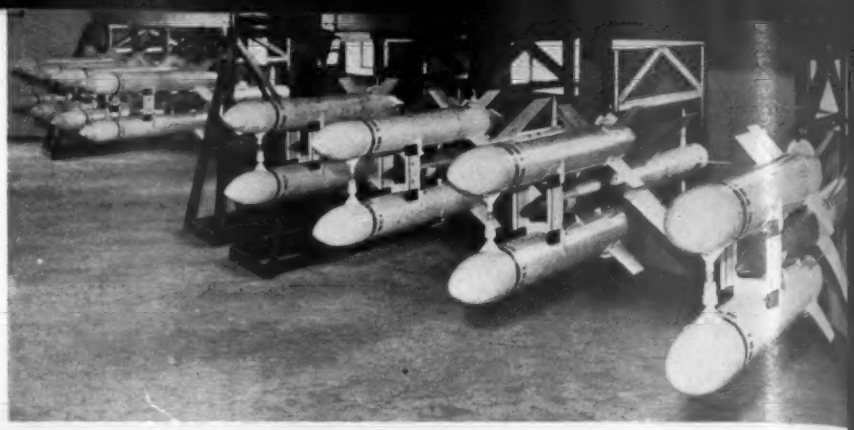
5. Meanwhile, independent checks are being conducted with the power components of Fireflash, which comprise two 5 in. booster rockets. One is seen here being checked on the standard Fireflash handling trolley.



6. Boosters and "dart" afterbody are finally married together, and the igniter leads are connected to the front of the rockets.

7. Completely assembled, the Fireflash is then charged with nitrogen, for operation of its pneumatic system.

Photographs copyright "The Aeroplane"



8. The assembled Fireflashes, all with telemetry heads, are stored ready for use in heated huts.

9. When required for use, they are transferred on their special handling trolley, and with protective guards placed temporarily over wings and fins, to the underwing racks of the Swift Mk.7s.

Photographs copyright "The Aeroplane"

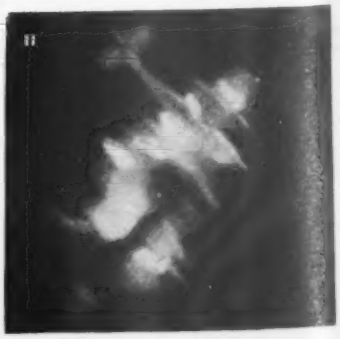
drum, surrounded by shock-absorbing material, and is quickly fitted in the missile laboratory with its cruciform wings of just over 2-ft. span, and its 1.54-ft. control fins. The complex internal mechanism is also removed for the installation of the miniaturized batteries, and after initial assembly the afterbody is ready for functional testing.

On large electronic test rigs aerodynamic behaviour of the Fireflash, which is mounted on a turntable, is simulated, and the response checked of the guidance system. On other moveable cradles, the transmission of the telemetering heads are checked, and after further testing, the "heart" of the missile is ready for assembly with the booster power unit. The rockets, and explosive separation unit, in turn, have been thoroughly checked in special test cells, and their wiring tested for continuity and correct resistance. The actual tests are done by remote control, for absolute safety, after which assembly of the complete missile takes place in another cell.

After having their storage bottles (for the pneumatic system) charged with nitrogen, the Fireflashes are then either stored in the open, in special containers, which are also used for their transport or hung in racks in heated storage rooms. They are then ready for almost immediate use. A complete and exclusive technical description of the Fireflash appeared in THE AEROPLANE of August 15, 1958.

10. The Swift 7s of the Missile Development Squadron have extended wingtips and noses, the latter for the radar "beam" scanner, and launch two Fireflashes from underwing pylons.

11. A proximity fuse makes a near miss as lethal as a direct hit, as shown by the destruction of this Meteor "drone."



Automatic Landing Developments

TO RIDE in the right-hand seat of a Canberra T.4 during a standard ILS (Instrument Landing System) approach on automatic pilot followed by a manual landing is in no way a novel experience, but to sit there while the final approach, flare-out and landing sequence are completed with the pilot resting his hands upon his knees is something new. Apart from selecting ILS glide path in the normal way at the start of an automatic approach, the pilot, Flt. Lt. A. Campe, acted only as a monitor until he took over control again during the landing run.

This demonstration of a completely automatic landing was given last week by the Blind Landing Experimental Unit (B.L.E.U.) of the Royal Aircraft Establishment, Bedford, as part of a special preview display of its work which is being shown to visitors this week. At these demonstrations, which were due to have been seen by the Minister of Supply, Mr. Aubrey Jones, and representatives of civil airline operators and M.T.C.A. on October 16, and Service chiefs, R.A.E. and M.o.S. personnel today, B.L.E.U. was showing the results of its development and research into automatic landing systems and visual aids to approach and landing.

During the course of a day's visit guests were to be given demonstration flights of the automatic landing system and of the visual aids in either a Canberra or Varsity. Between them they were to inspect static exhibits of the system, including models of the equipment used in the aircraft, a display and film of various types of airfield-lighting patterns, a model of the new angle of approach indicator (described in THE AEROPLANE of August 15, 1958) and an approach and landing simulator.

But before describing the B.L.E.U. automatic landing system, and the unit's visual aids to approach and landing, it is worth considering the current approach aids in service and the one other automatic system known to be under development. This latter equipment is an American system by the Bell Aircraft Corporation and is for the United States Navy.

There are four principal approach aids worth noting. The first is ILS, a c.w. system developed originally in the U.S. and latterly in this country by Pye Telecommunications, Ltd., in conjunction with the Radio Department and B.L.E.U. of R.A.E. Next is Precision Approach Radar (PAR), a primary radar which forms the approach element of the ground-controlled approach system. A version of this has been developed in this country by Standard Telephones and Cables, Ltd.

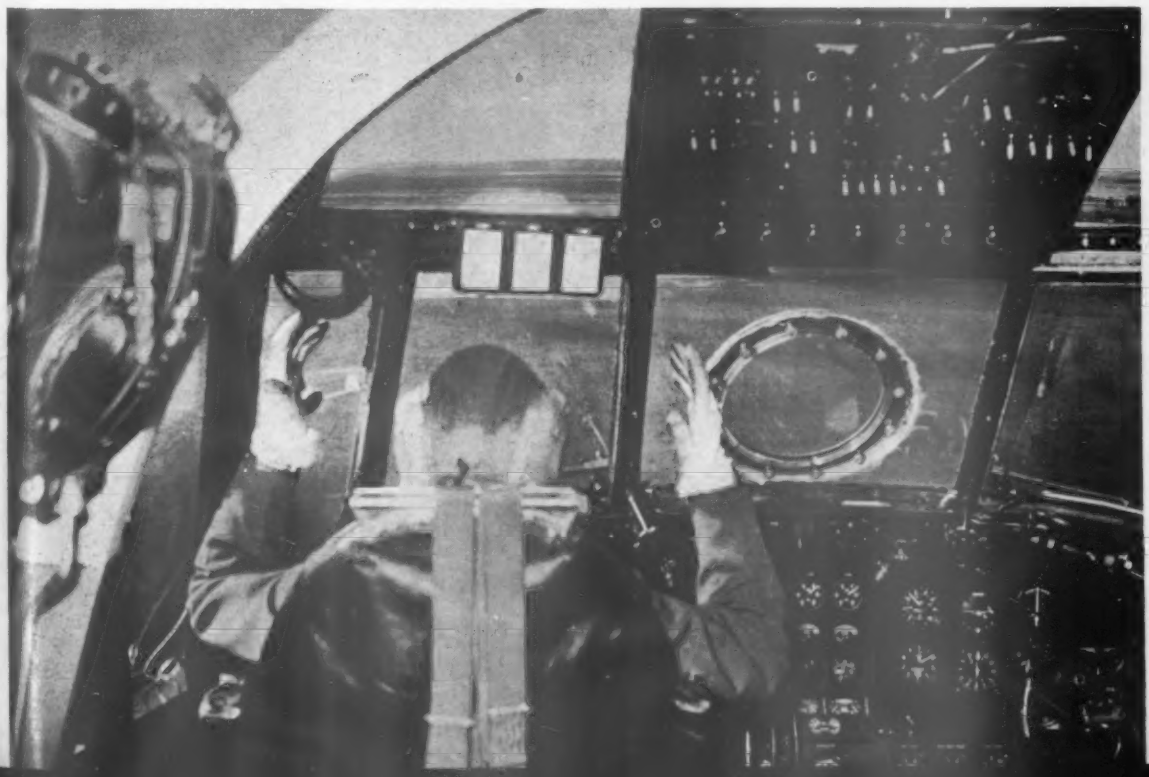
Third is Airfield Control Radar (ACR), a primary radar designed essentially for air-traffic control purposes, but also used as an approach aid. Various types of this equipment have been designed and produced in the United Kingdom, including the Decca 424. Last of the four aids is a Beam Approach Beacon System (BABS) Mk. 4, a secondary radar developed in this country during the 1939-45 War and more recently by Murphy Radio, Ltd., and a Swedish company in conjunction with B.L.E.U.

The ILS defines an equi-signal approach path to the runway which in azimuth lies along the extended runway centre-line (localizer) and in elevation (glide-path) is inclined at an angle of approximately 3°, intersecting the runway at the desired touch-down area. Guidance in both planes is provided by independent radio transmitters separately sited on the airfield. Coded fan-marker transmitters located at two or three points on the approach path give spot indications of range from touch-down.

The localizer, glide-path and fan-marker transmission are received and decoded by the receivers in the aircraft, and continuous positional information can be immediately displayed to the pilot for a manual ILS approach, used to compute instructions for interpretation by the pilot (semi-automatic approach) or fed to an automatic pilot to provide complete auto-coupling to the radio beam.

Precision Approach Radar operating in the 3-cm. band provides accurate information on aircraft elevation, azimuth position and range relative to touch-down. Separate horizontal and vertical aerials are used and echoes from an aircraft are presented to the ground controller on two cathode-ray tubes, one displaying elevation/range information and the other azimuth/range information. From the comparison of these echoes with a pre-set azimuth track and glide-path, steering and heading instructions can be given to the pilot.

Airfield Control Radar is a simpler primary radar than PAR providing only azimuth and range data. Azimuth information



A "hands-off" approach in the Varsity under automatic control.

A Varsity landing after an automatic approach. The average g-loading on touch-down is 0.8.

may be presented on two p.p.i. displays, which can be arranged to provide both talk-down information and general air-traffic control surveillance up to maximum range. As in the PAR system, the ground controller passes to the pilot the necessary heading instructions. Glide-path information is based entirely on range, so that the pilot is given the rate of descent needed to maintain the glide-path with height checks, based on ranges at one-mile intervals.

The BABS Mk. 4 localizer beacon has been added to the BABS secondary-radar beacons and, used in conjunction with Rebecca Mk. 8 airborne equipment, developed as a navigational aid for single-seat fighters, provides azimuth-displacement information relative to the runway. This is presented in the form of continuous left/right indications on the landing needle of the cockpit distance-measuring indicator. Range from touch-down is indicated on the same dial. The equipment has an operating range of approximately 20 nautical miles at 1,000 ft.

Limitations to Approach Aids

The various accuracies of these four approach aids and their couplers have been analysed by B.L.E.U. from information obtained from at least 50 approaches at 135 knots on each aid. These analytical studies have shown that there is little hope of extending, with safety, any system of blind-approach aid plus visual landing to operating limits lower than about 150 ft. cloud base and 1,500-ft. slant visibility.

With BABS Mk. 4 and the Decca 424 radio, the two aids without glide-path guidance, the height errors are large. Relative to the PAR, the azimuth performance also shows signs of the extra mental effort required by the pilot to calculate and fly the glide-path. Below a height of 300 ft. manual ILS is no more accurate in azimuth than the BABS Mk. 4 or Decca 424. There is, however, an increase in glide-path accuracy.

On PAR the accuracy of both azimuth and glide-path flying is better than on manual ILS and similar to that of the semi-automatic ILS (using a zero-reader). The performance of automatic ILS is better than the others in all respects at heights in the region of 200 ft., giving a standard deviation of about 50 ft. in azimuth and 10-ft. in height.

But the accuracy of these aids is only part of the assessment of the operational value of the equipment, as it is still necessary to establish that, having made visual contact with the airfield lighting pattern at a certain range or height, the aircraft can manœuvre to correct the errors present at that range and make a safe landing. If this is not possible, the visual phase must be started earlier, at enough range from touch-down to allow the corrections of errors, so that the aid is limited to a higher "break-off" height.

From these facts it can therefore be seen that only the complete elimination of the visual phase will bring improvement. This can be achieved by extending the automatic approach technique to touch-down and possibly down the runway.

In the Bell system this is undertaken by feeding the aircraft to a "gate" by a navigational aid, from which point the approach and landing are stated to be automatic. A ground radar passes aircraft-position information to a ground computer, which in turn feeds calculated control signals to an automatic pilot in the aircraft, so completing the control loop.

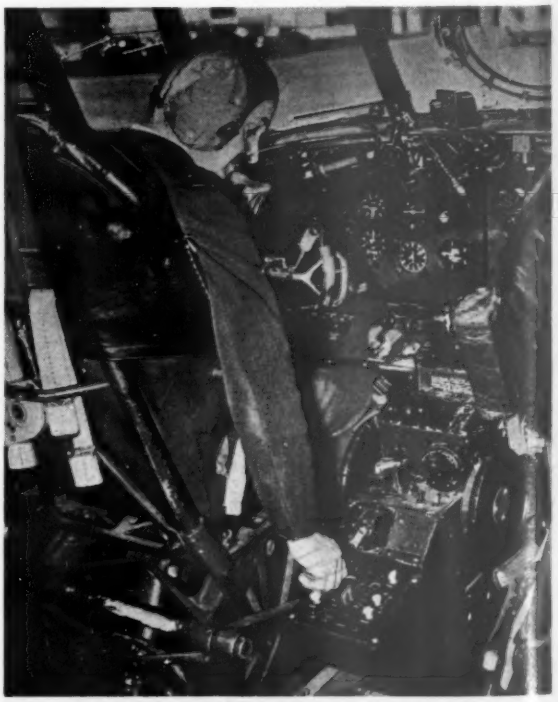
It is claimed that more than 1,200 fully automatic landings have been made by a number of different types of aircraft at a number of airfields in all types of weather. The quoted accuracy of landing performance is very high and it would appear that very little flare-out is being attempted.

The B.L.E.U. System

As recorded in the first paragraph, in the system developed by B.L.E.U. the aircraft is landed completely automatically with the pilot acting only as monitor. During the past three years more than 2,000 landings have been made with the equipment. Of these, more than 500 have been completed in the past two months.

Of the total, more than one quarter have been made with complete automatic control, although in some landings manual control of the throttles was exercised; but in all cases all flying controls were operated automatically. The remaining number have comprised touch-downs with only partial automatic control; for example, control in one plane only or an automatic flare-out to a datum a few feet above the runway. In making these 2,000-odd partial, or completely, automatic landings, the Unit's Varsity and Canberra aircraft have suffered no damage.

The automatic system obviously requires an automatic pilot, which in the demonstration was similar in many respects to the Smiths Aircraft Instruments S.E.P. 2 civil equipment installed on Comets, Britannias and Viscounts and provides coupling to ILS and VOR beams, height lock and airspeed lock, into which is fed guidance information. A coupling unit computes the



The right hand of the pilot on the B.L.E.U. automatic flight control panel in the Varsity. The flight instrumentation is the Smiths Flight System.

Nominal Height in Ft.	Phase	Guidance.	
		Azimuth	Elevation
Circuit to 300	Glide	ILS Localizer	ILS Glide Path
300 to 150	Leader Cable	Leader Cable	ILS Glide Path
150 to 60	Attitude	Leader Cable	Constant Attitude
60 to 20	Flare-out	Compass	Radio Altimeter
20 to 0	Kick-off Drift	Leader Cable and Compass	Radio Altimeter
0	Ground Run		—

The various phases of guidance during the B.L.E.U. automatic approach and landing are summarized in this table.

manœuvre required to keep the aircraft on the desired flight path, which is undertaken by the automatic pilot servos operating the aircraft controls.

There are several phases of guidance during an automatic approach and landing covering glide (ILS), magnetic leader cable, attitude and radio altimeter. These are summarized in the table on this page.

The ILS ground equipment in use at Bedford is the Pye Telecommunications system with the Standard Telephones and Cables airborne equipment. This latter unit—type SR 14/15-B—provides zero-reader left/right indication of the runway and up/down indication of the glide path and aural and visual marker beacon indication.

Developed and produced by Murphy Radio in conjunction with B.L.E.U., the magnetic leader cable ground installation consists of two cables situated about 250 ft. each side of the runway from approximately 5,000 ft. in front of the threshold point to as far along the runway as azimuth guidance is required during the landing run. Each cable is fed from a 31-kVA alternator with a current at different frequency. The magnetic fields from these cables are detected in the aircraft by a rotating loop assembly and their value is compared in a receiver. This allows position relation to the runway centre-line to be determined to better than 5 ft. Flight-test facilities are also fitted for checking the equipment before the aircraft is committed to a landing procedure.

At approximately 150 ft. on the approach, when the ILS glide path signal may become unreliable, it is switched out by the radio altimeter, and the aircraft maintains the average attitude it has adopted during the glide-path descent. This condition is maintained until a height of 60 ft. is reached, when the radio altimeter is employed for the final flare-out.

The radio altimeter used is the Standard Telephones and Cables type STR.30-B1. A frequency-modulated equipment, it indicates the clearance between the aircraft and the ground down to zero feet, so that it can be used on approaches to the point of touch-down. The zero can be adjusted to the undercarriage height and the normal landing attitude of the aircraft. Once adjusted, the zero is stated to be stable to within 1 ft. It can also detect a change of height of not more than 2 ft. and can therefore produce a signal accurately proportioned to the rate of change of height. These proportions are used from 60 ft. to control the pitch attitude so as to make the rate of descent proportional to the height. This gives a very smooth flare-out, and is used right down to touch-down.

At about 20 ft. the final switching action takes place to kick off any drift caused by crosswind. Leader cable guidance is disconnected, the wings are levelled, and rudder is applied to change the aircraft heading to that of the runway (preset on the gyro compass at the start of the landing).

An important feature of the system is that during all phases of the landing, monitoring signals are displayed on the normal flight instruments forming part of the Smiths Flight System. The only additional instrument is a sequence indicator showing the landing phases to the pilot. The final component is the automatic speed control produced by Smiths. This controls the throttles automatically so as to maintain a constant preset speed during the approach until flare-out, when the throttles are automatically closed to safe ground idling.

Safety and Civil Application

Introducing the system at the start of the demonstrations, Mr. W. J. Charnley, superintendent of B.L.E.U., stated that discussions with a number of airline operators had been made, and the application of the aid to civil aircraft was being considered. But first it must be engineered to meet civil safety standards and international agreement must be obtained for its adoption.

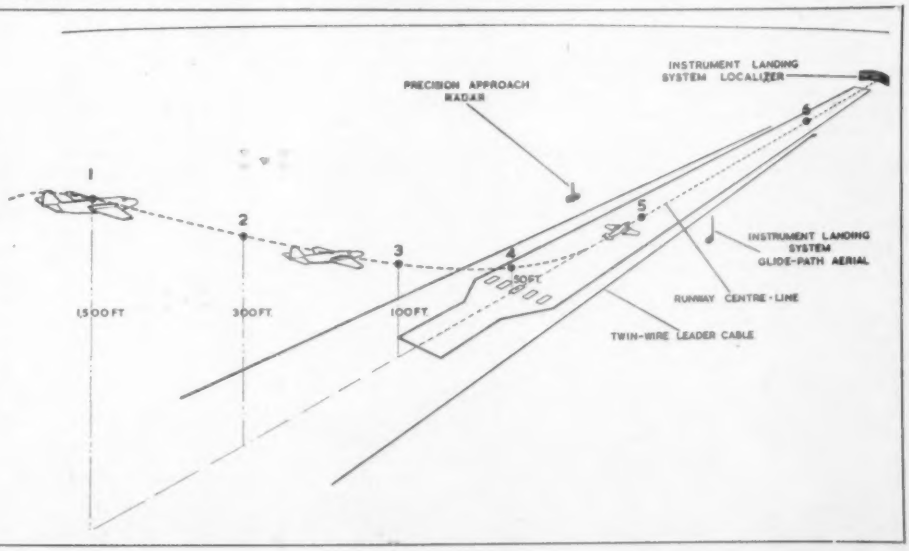
Its first use in a new transport will be in the Vickers V.C.10, where the automatic flare-out equipment, using three independent systems, is to be installed. This particular component is independent of any ground equipment, except for ILS which is in general use.

As far as accuracy is concerned, Mr. Charnley said that the lateral error was less than 10 ft., the heading error was within ¼° at touch-down and the deviation of touch-down along the runway was 250 ft. During the three automatic landings while I was in the Canberra, when the controlled approach speed was 120 knots and the touch-down was made at 98 to 100 knots, the average *g*-loading on landing was 0.8.

Research at Bedford is also progressing on other methods of making a blind landing. In one the object is to present to the pilot in bad visibility a picture similar to the airfield lighting pattern. For this the runway should be outlined by a pattern of radio beacons whose positions relative to the aircraft would be determined by an airborne receiver and displayed on a cathode-ray tube mounted in front of the pilot. This system could be used as an independent monitor of the automatic landing system

To explore the possibility of landing an aircraft from guidance obtained from a two-dimensional picture of the runway, closed-loop television circuits have been installed in a Devon and a Meteor. The television camera is mounted in the nose of the aircraft and the cathode-ray tube monitor in front of the second pilot

Other work of B.L.E.U. covers the more immediate problem of assisting the pilot in manual landing following an instrument or automatic approach. This includes the development of the angle of approach indicators (described in an earlier issue), the assessment of the internationally recognized Calvert centre-line and cross-bar approach lighting pattern, with other aids both in flight and using the Unit's approach and landing simulator.—P.R.R.



From an automatic ILS approach altitude of 1,500 ft. (1) the pilot selects ILS glide path (1-2-3). At approximately 100 ft. (3) the leader cable is brought in together with constant attitude control, the radio altimeter controlling the flare-out and landing (4-5). The ground run (5-6) is made manually using leader cable and compass.

From the Lecture Room

AUTOMATIC HELICOPTER FLIGHT SYSTEMS

ON Friday, October 3, The Helicopter Association of Great Britain arranged a lecture on "All-weather Helicopter Systems." This paper, by Mr. Walter Gerstenberger, Chief of Dynamics at Sikorsky Aircraft, deals with the navigation and automatic control systems of the company's HSS-1 helicopter for the U.S. Navy and its latest version, the HSS-1N.

This helicopter, powered by two General Electric T58 shaft turbines, has power controls in the form of two independent hydraulic systems, one system being powered by an engine pump and the other by a rotor-driven pump. DC electrical supplies are provided by engine- and rotor-driven generators, with three inverters producing the AC supply. The automatic stabilization equipment employed in the HSS-1 was developed by Sikorsky and has a present reliability of about one malfunction in 800 hours.

The Sikorsky automatic stabilization system operates without requiring the pilot to perform all his duties himself, as certain procedures can be delegated to automatic control. By limiting the authority of this control to the point where it can still perform its task, but leaving the pilot inherently in full authority at all times, especially during emergencies, a fail-safe condition exists where 100% reliability is not required for the aid.

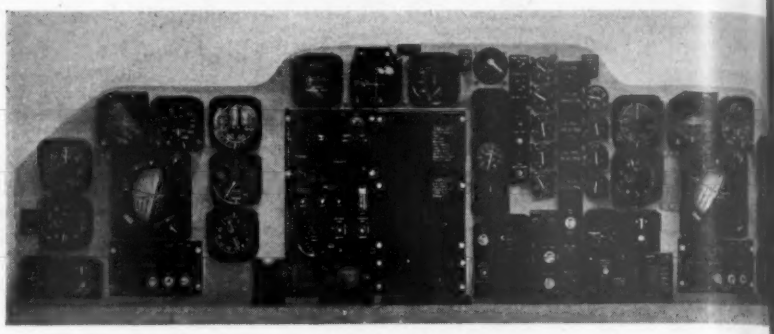
The incorporation of additional features for improved limited-visibility flying in the HSS-1N preserves this concept of delegation of limited authority used in the HSS-1, but extends it to the rotor r.p.m. control in the form of a throttle governor and to the Doppler hover mode with the facility of the automatic approach to the hover. This aircraft is an anti-submarine naval helicopter and the facilities added to the HSS-1N provide an extremely interesting example of a solution to the difficult problem of the approach-to-the-hover and hover over the water with enough accuracy so that the sonar transducer may be lowered into the water without damage. All this is done without dependence on outside visual references.

Instrumentation Layout

In addition to automatic control equipment the instrument panel has been redesigned to provide additional information and integrated to provide for a more convenient scan pattern.

To the left of the pilot's panel are all instruments for engine monitoring. In operation, when everything is normal, all needle positions are vertical. Underneath these are the electrical system control switches which provide selection of alternative electrical power sources. In front of the pilot are the basic flight instruments, in the centre of which are the essential instruments for going into hover from forward flight. All of them are entirely new: the dual-purpose hover indicator which shows Doppler ground speed or cable angle; the improved radar altimeter with an expanded scale to show height above the surface to within 2 ft.; and the remote attitude indicator, with both roll and pitch-trim adjustments. Instruments for power monitoring are to the pilot's right, along with the compass.

The cyclic stick has been shortened for a better view of the instrument panel,



The instrument panel of the Sikorsky HSS-1N helicopter. On the right- and left-hand sections of the panel are the pilot's and co-pilot's flight instruments, with the navigation and engine controls in the centre.

and a new trim button has been added, which allows the pilot to make small stick-feel corrections without losing his established reference. The automatic stabilization equipment provides engagement and disengagement for stabilization in pitch, roll and yaw, altitude and automatic hovering using the sonar transducer cable as a reference. It also provides for small heading trims and corrections for fore and aft C.G. trim.

Hitherto, when the pilot engaged automatic stabilization he had pitch, roll and yaw stability. After he lowered the sonar transducer, he obtained automatic hover over the cable. The conventional cyclic stick, without automatic stabilization is normally fed through mechanical linkage and a hydraulic servo to the rotor blades. Automatic stabilization input was introduced by an electric servo working through a differential link, to make small, limited-authority corrections through the hydraulic servo, to the blades. Thus, in normal operation, the attitude of the helicopter was stabilized as determined by the pilot's stick position. The stick-centring spring was used in conjunction with a magnetic clutch. When the clutch was engaged, the spring provided stick-feel and a referenced position if the pilot removed his hand from the stick. Disengaging the clutch allowed the pilot to shift his reference to a new position.

Another feature of the HSS-1 was the sonar coupler which operated from a cable-angle sensor. The cable-angle sensor induced a signal into the coupler which sent a command signal that was introduced into the automatic stabilizer to maintain the helicopter in position over the sonar transducer.

In the new HSS-1N a number of features have been added in the pitch-and-roll channel. A Doppler ground speed system has been added and can be selected as the primary sensing for the coupler. The automatic control circuits of the coupler will bring the helicopter to a hover from any lateral or longitudinal flight condition. However, to make it possible for this control to work through the whole flight range, it was necessary to extend the automatic control authority beyond the limits provided by the servo motor input.

The altitude channel is basically the same as the pitch channel except that the pilot's control is the collective. Altitude errors are detected by a pressure sensor, and the coupler is fed by the hydrostatic depth sensor or the radar altimeter.

The other new feature of the HSS-1N is the automatic engine-speed control. A conventional engine throttle control on the collective-pitch stick is combined, in the differential adding mechanism, with a signal from the output of the collective hydraulic-servo. This arrangement permits the mechanical synchronizing type of control where increases in power requirements from collective - pitch stick motions anticipate the need for throttle increases, thereby preserving the configuration used in manually controlled throttle systems and reducing the work load of an automatic control for engine speed. As with the other stabilized primary controls, the command signal for increased r.p.m. or power is introduced in the throttle grip whether manual or automatic control is used.

Automatic Approach

To make an automatic approach to the hover, the area is approached to within 100 ft., where altitude may be maintained with the help of the pressure altitude control. When approximately 500 yd. downwind of the hover point, and proceeding at about 40 knots, the pilot sets his radar altimeter at, say, 50 ft. and engages the hovering coupler which then seeks to cancel out the forward and lateral drift velocities sensed by the Doppler system. The circuits are timed to give a uniform reduction in speed and altitude which would simulate the manual flight made by a cautious pilot during a visual approach. The pilot, during this blind approach, may monitor the manœuvre with no movement of the controls, or may alter the approach with manual inputs with no disengagement of any of the automatic facilities nor any override forces other than the normal stick-trim forces which provide a small force gradient to the controls.

The HSS-1N illustrates what can be done for a particular mission, such as anti-submarine warfare search with a helicopter. It is true that some operators would have little use for a helicopter that could come to a hover without external visual references over an expanse of water, but it is also true that the techniques and hardware used in this application of instrument flight could be used with slight alterations for other problems. The automatic stabilization equipment has passed all the Civil Aeronautics Authority certification tests.

More About German Airships

In our issue of August 1 we published some brief details, by LORD VENTRY, *about recent airship developments in Germany; here, he deals primarily with the Trumpf airship.*

AFTER talking to the Zeppelin men, I was free to see existing non-rigid craft. Of these the Underberg was at Bielefeld, while the Trumpf was being inflated, and awaiting her car, so I did not see her on my first visit to Germany this year.

Owing, however, to the helpfulness of Paul Wagner, the Underberg P.R.O. with the airship, I was able to revisit the Underberg craft and found her moored out in a small pine-tree-surrounded airfield at Bielefeld.

Gerhard Schmidt has taken Charles Propst's place as chief pilot, the latter being now in the U.S.A. He is seconded by a recently trained pilot, Helmut Gulsdorf, who not long ago piloted an aeroplane, airship and glider in the course of one day. I was lucky enough to make three flights in the ship, totalling 8½ hr., during my 24 hr. with it. On one of them we flew over a large gliding centre at Erlinghausen. The ship has flown more than 300 hr. this year, and over 2,000 hr. since her first inflation in March, 1956. She is, of course, only in commission for about eight months each year.

The Trumpf Airship

The new Trumpf airship, built under Goodyear licence, is the third owned by the Leonard Monheim chocolate company of Aachen, Germany. Founded in 1857, this firm employs 8,500, and is the largest of its kind in Germany.

The ship made her first flight on July 17, 1958. She was airborne for 106 min., and behaved very well. She was piloted by Herr Rienau, who was in charge of the pre-War Trumpf airship, in which he made about 1,200 flights. This ship was the DPN 28, built by the Parseval Natz Co., of Stolp, in Pomerania.

The pilot on the next six flights was Gerhard Schmidt, of the Underberg airship. The sixth, the longest to date, was of 3 hr. 57 min. duration.

This was on July 23, when they flew to Friedrichshafen and back, reaching 6,600 ft. as an altitude test. When flying over the old home of the Zeppelins, she received a great ovation, for it was in the former Zeppelin works that Metallwerk, the successors of the Zeppelin Airship Co., built the car of the ship. The envelope came out of Ballonfabrik Augsberg, which was founded by E. Riedinger in 1890. They construct all the free balloons used by the five German free-balloon clubs, 80 ascents having been made between February 1 and June 30 this year.

The Trumpf airship was at Stuttgart when I saw her. She was moored to a 33-ft. high mast, and there are many interesting features and improvements. For example, she is larger than the Underberg, and is fitted with more powerful engines. She has an auxiliary blower in the stern of the car by which pressure is kept up in the envelope while she is moored on the mast and also while landing in calm weather. The two ballonets each hold about 17,000 cu. ft. of air, the total volume being 158,895 cu. ft.

AIRPORT VISITOR.—The Underberg airship is seen here flying over Stuttgart Airport.

There are two air valves, situated just over the stern of the car, so opening pressures can be checked and altered in flight. The air to these valves is led from the ballonets via internal airducts.

There is an indicator which shows if there is any hydrogen gas in the ballonets, and air and gas thermometers assist the pilot to calculate lift. He will also know why the ship becomes heavy or light.

The air scoops to the ballonets are now part of the engine bearers and offer less drag than before. This is the same arrangement as is found on the Goodyear K airship.

The controls are as usual for a small airship: steering by rudder bar, elevating by means of a large fore and aft wheel arranged between the pilot and co-pilot. To the left of the pilot are the throttle controls, and also the controls to the reversible propellers, which have been fitted on this ship to make landing easier.

The draw-knobs for the air dampers and valves, and gas valves, ballast and so forth, are arranged in a row above the pilot's head. There are not quite so many of them as on the older ships, which makes piloting easier.

The difficulties in landing in light winds have now been overcome by means of the reversible propellers. The ship can be brought to a standstill in 16 sec. when travelling at about 40 m.p.h. There is also the auxiliary blower, so there is now no need to keep up a high landing speed to maintain envelope pressure. There are two sets of pressure indicators, and it is possible to see at a glance not only the pressure in the gas envelope but also that in each ballonet.

Wireless is carried, also a loud speaker, so that the pilot can give instructions to the ground-handling party.

The castoring wheel under the car is most important. The ship

A PRACTICAL AIRSHIP.—The Trumpf airship is 159.3 ft. long for a diameter of 34.89 ft. It has a volume of 158,895 cu. ft. and is powered by two 180-h.p. Warner Scarab engines. It made its first flight on July 17, 1958.

takes off and lands on this, and she pivots on it while on the mast.

On two occasions on July 25 she was caught in thermal bubbles, which caused the stern to rise. I was on board on the first occasion, talking to one of the crew. The motion was so slow and smooth that neither of us noticed anything until we happened to look out and found ourselves some way above the ground. The crew member at once went to the elevator wheel, and soon got the ship back on to a level keel.

The permanent crew is seven, and when the ship flies they recruit temporary help according to the strength of the wind. Herr Rienau at the moment is the only qualified pilot, but there are two others—Herren J. Hempel and Hans Kofen—under training.

The crew were employed last year on the second ship owned by the firm. This vessel was unfortunately rather a failure, and she was never re-inflated after her mast collapsed in a gale. She had made, however, 26 flights totalling about 43 hr. Useful training is to be had while watch-keeping on the ship when moored to a mast. Pressure must be maintained and the ship kept trimmed.

I was with the ship from July 23 to 26; all sorts of finishing-up jobs were being done on the ship and an oil tank was under repair at Friedrichshafen. Herr Gruender and some of the ladies of Ballonfabrik were fairing-in the external suspensions over the car, and the upshot was that the ship was not ready for flight until rather late on July 25.

On the following morning everyone was on the aerodrome by 06.00 hrs. when she made her eighth flight, piloted by Herr Wilhelm Rienau.

The Trumpf was off the mast by 06.35, and airborne at 06.40. She was about 100 lb. heavy, and her after-plane touched the ground as she taxied for her take-off. This plane is fitted with a wheel to allow for this.

She then climbed at an angle of perhaps 20°, and was up about 1 hr. 31 min.

The conditions were ideal for testing the value of the auxiliary blower and also the reversible propellers. There was practically no wind, and the sun, already hot, was giving the ship a false lift.

After ballasting up they came in making a normal trial approach. She was too high for the 10 men forming the landing party to man the guys.

The airship then made another circuit. This time one of the propellers would not go into reverse, and as a result they overshot the landing party. So, hauling up the trail rope, they went round again.

At the final approach the 160-ft. long trail rope was dropped just ahead of the landing party; the single propeller was put into reverse earlier, and the ship then made a good landing.

Herr Rienau spoke very highly of her controllability, and told me that when both engines were revving at about 1,750 r.p.m. and the ship was properly trimmed and the controls centralized, she would fly herself for long periods.

Taking part in most of the tests was Herr Eric Thomas, who represented the equivalent of the Air Registration Board. As an airship pilot with 6,000 hr. flying experience, he was a very great help to the Trumpf's crew, and with this airship experience behind him, he knows just what to look for. He flew the pre-War Trumpf and also DPN 28 and 29. On the last ship, DPN 30, which he flew for Odol, he did about 4,500 hr. These were the last Parseval airships to be constructed.

Once the Trumpf is through her trials she is to be flown to München Gladbach, where she will be based for a time. There is also a possibility of a shed being built there. München Gladbach is not far from Aachen, where are the headquarters of the Lenard Monheim firm.

If the Trumpf is a success, there is a possibility of one or more ships being built on similar lines. The Underberg ship may also be modified this coming winter, and in any case Ballonfabrik are making a new envelope for her similar to that of the Trumpf ship.

Modern Medicos

At a demonstration by the Field Training Centre, R.A.M.C., at Mytchett, near Aldershot, on October 3, a situation was enacted involving a mock attack by a low-yield nuclear weapon. The primary purpose of the exercise was to show that medical services can, by the use of rotary-wing aircraft, be taken to an operational front, besides the evacuation of wounded. It also emphasized that all other ranks of the Army Medical Services must now be prepared to undertake special duties which were previously those of doctors and nurses exclusively.

Evacuation was begun by a Fairey Ultra Light helicopter which (right) was modified to carry a stretcher. The setting up of a first-aid post was demonstrated (above), by a Westland Whirlwind, which made 14 air-lifts and also evacuated wounded on the return trips.

Below, a special demonstration was given by the Fairey Rotodyne here seen with a load of 47 nurses of Queen Alexandra's Royal Army Nursing Corps.

Photographs copyright "The Aeroplane"

Private Flying

H.J.C.'s CLUB COMMENTARY

● RECENT events at Fair Oaks have included the flying display of the **Vickers Flying Club,** held on September 21, when visitors included Lord Brabazon and Sir George Edwards, and on September 27 the **Fair Oaks Aero Club's** competitions were flown. The latter were unfortunately not very well supported, but Messrs. D. Sole and H. Hall won the navigation competition, given to the club by the Esso company and presented by Mr. Bugby of that concern. The Fair Oaks Cup was easily won by Mr. H. J. Pelham.

New P.P.L. holders are Messrs. Stevenson, Cole, Bainbridge, H. J. M. Smith, Blacklock, Gessey, Layton, J. S. Mitchell, Figg, Lessware and Balderamos, and A.T.C. cadets Downland, Hughes, A. J. W. Smith, Hamilton-Duirs and Fogarty. Mr. Peter McIntyre has gained his C.P.L.

First solos have been flown by Messrs. Meers and Sherwin.

As from November 3 the club will be closed for flying on Mondays; private owners will be able to fly their own aircraft, but the aerodrome will be closed to visitors.

The club's dinner is to be held tonight (October 17) at the Ardington Rooms, at Clapham Junction. The guests of honour will be Miss M. Freeman and Maj. F. Fox.

On October 29 the club begins the course for the restricted R/T licence.

GOOD PROGRESS.—Mr. Henri Pelham, 21, has gained the Fair Oaks Cup for being that club's "best pilot of the year."

● THE Minister of Transport and Civil Aviation has agreed to meet a delegation from the **Royal Aero Club** aviation committee to discuss the problems raised by the proposed closing of Croydon Airport. The delegation will be led by the club's chairman, Col. C. F. H. Gough; the other members will be Messrs. P. G. Masefield, R. E. Hardingham, H. B. Lindsay, J. M. Houlder and M. O. Imray and Capt. T. F. Gunn.

The meeting is to be at Berkeley Square House, London, W.1, at 15.50 hrs. on October 23.

● WE understand that since we mentioned in our issue of September 26, the Stage I and Stage II diplomas issued by the **Association of British Aero Clubs and Centres,** that organization has rece.ved many requests for details. The relevant information has now been put into pamphlet form by the Association, and those interested should write direct. The address is 7c Lower Belgrave Street, London, S.W.1. (Tel.: Sloane 1864.)

● FOR the third time the Norbury Unit of the **Women's Junior Air Corps** has won the Australia Cup, which was presented to the Corps in 1951 by the Air League of Australia. It is awarded to the unit gaining most aviation awards during the year: two Norbury cadets—Peggy Nye and Patricia Miller—gained their P.P.L.s, while nearly all other members received aviation badges. There are about 20 cadets in this unit.

Gliding Notes

by Dr. A. E. Slater

NOW THAT Betsy Woodward is back in the United States, after a stay in England which has lasted, with interruptions, more than four years, her devoted work for OSTIV has mostly passed into other hands, and is no longer done from Imperial College's Meteorological Department. Membership subscriptions are being looked after by another American resident in England, Mrs. "Bonny" Bentson, who, with her husband "Chuck" Bentson, has been attending the London Gliding Club for some years, and has put in a lot of volunteer work for it, especially in making the clubhouse look presentable.

The OSTIV business will be looked after by her at the club's London office, and the correct address for subscriptions and inquiries about membership from all parts of the World is: OSTIV, c/o London Gliding Club, 22 Half Moon Street, London, W.1.

The subscription for individual membership is $4 a year, or its equivalent, and cheques should be made out to OSTIV. In return, the subscriber gets (a) the *Swiss Aero Revue* with its OSTIV section every month, containing papers given at congresses; (b) reprints of papers from other journals; (c) free attendance at congresses, and (d) 10% discount on recent publications such as "Betsy's book" ("The World's Sailplanes").

* * *

"INTERIM Scheme for the Re-organization of the Manchester Control Zone and Re-alignment of Amber One" is the title of a document submitted by the civil aviation authorities to the Derbyshire and Lancashire Gliding Club. Considering that the original scheme for re-alignment would have put Camphill out of business as a serious soaring site, it is gratifying to learn that the revised scheme, incredible as it may seem, is so innocuous as to earn the club's approval.

The eastern boundary of the airway is now 2½ miles to the west of Bradwell Edge, and its base is raised from 3,000 to 5,000 ft. However, it is still at 3,000 ft. within 15 miles of Manchester, but cross-country flights with a westerly component have rarely been made from the site anyway. East-facing Mam Tor, from which such flights sometimes started, is just within the boundary.

* * *

This news in the club's latest newsletter is preceded by an open letter from "a V.O.P." to "a V.Y.P." giving some useful tips on slope-soaring in marginal conditions. The most obvious one is to do your turns at places where the lift is stronger than elsewhere, instead of doggedly pushing on to the end of the beat before turning. It is assumed that these are places where the wind is "funnelled," which it can be by an irregularly shaped ridge, and that the increased wind pushes on a Tutor's rudder harder than on its nose. So you say to yourself: "Tutor knows best," and let it turn into wind.

This "weathercock" action is obviously impossible in a uniform wind, though many people have vehemently declared otherwise. The strongest weathercock tendency I have ever seen was with open primary gliders soaring along the sand dunes at Rossitten, on the Baltic coast. The most plausible explanation seemed to be a sharp increase of wind with height, so that the rudder, being higher than the nose, was pushed more strongly to leeward. Model gliders with high tails can behave similarly when slope-soaring in strong winds.

Basil Meads has been chairman of the Derbyshire and Lancashire Club for 23 years. On September 20 they gave him a party—not for this, but for his silver wedding anniversary.

Later social events include a barbecue on November 1, annual dinner and dance at Buxton on November 28, and Christmas party on December 20.

* * *

ALL three legs of the Silver "C" were flown in a Tutor, a machine commonly used for first solos, by John Deas, of the Cambridge University Gliding Club. He completed it with a 5-hr. flight during the club's September camp at the Long Mynd, when 125 hr. were flown in a week, mostly on two consecutive days. The longest cross-country was 135 miles to King's Lynn by Ernest Clarke.

Among notable flights from Cambridge recently was one to East Kirby, in Lincolnshire, by "Bill" Menkevich, who thus becomes, it is believed, the first U.S. Serviceman to gain a Silver "C" in England. I saw him depart from Cambridge on his first attempt on February 16 this year, along a cumulus cloud street.

The club has acquired an Eagle, described in the latest newsletter as "such a lovely thing to fly." Although not used for elementary training, it is kept exceedingly busy, what with conversions to higher-performance aircraft, aero-tow and instrument-flying instruction, but above all, because everybody wants to fly in it.

* * *

FIVE new national and U.K. local records have been confirmed by the British Gliding Association. Two of the national records were set up by Tony Deane-Drummond, from Leszno, during the World Gliding Championships in Poland: a 200-km. triangle at 73.05 k.p.h. (45.36 m.p.h.) during the practice period on June 13, and a 100-km. triangle at 76.6 k.p.h. (47.5 m.p.h.) on the second contest day, June 17.

U.K. local records are: speed in a straight line to a 200-km. goal by Nicholas Goodhart, 58.8 m.p.h. from Nympsfield to Great Yarmouth during National Gliding Week; two-seater out-and-return distance by John Williamson and Ann Welch, 102 miles, from Lasham to Westbury and back; and a women's out-and-return record of 94 miles by Mrs. Anne Burns, from Lasham to Kidlington and back. Mrs. Burns now holds five women's U.K. records, Mrs. Welch one and Mrs. Rika Harwood one

There are several British records still waiting to be set up: women's records for absolute altitude, 200- and 300-km. triangle speeds, and speed to a 200-km. goal; also two-seater records, both national and U.K. local, for absolute altitude and the 300-km. triangle. An absolute altitude record must include a climb of 5,000 m. (16,404 ft.).

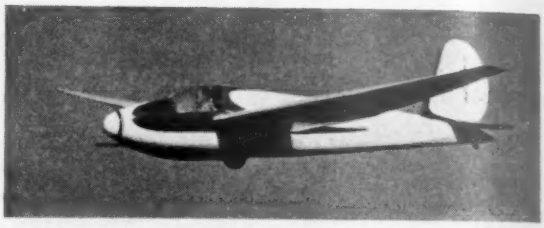
Sailplane Meet at Harris Hill

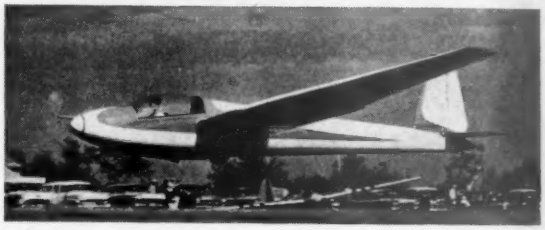
FROM August 30 to September 1 the 1-26 One-design Regatta was held at Harris Hill, Elmira, N.Y., bringing to the site of the soaring capital of America a total of 17 Schweizer 1-26 single-seat sailplanes. Most of them, if not all, were built up from do-it-yourself kits produced by Schweizer Aircraft Corpn. Since the type first appeared in 1954 more than 86 have been sold.

A spirit of rivalry has developed during past meets between Canadian and U.S. sailplane enthusiasts: as a result a special contest was evolved, known as the Brantford-Elmira Friendship Meet, and was held in conjunction with the 1-26 Regatta. These two meets brought to the Hill a total of 30 gliders and pilots and crews from New York, Connecticut, Pennsylvania, Indiana, New Jersey, Maryland, Ohio and Ontario.

Unfortunately the weather gods did not co-operate. On the first day a low ceiling prevented anybody from obtaining any altitudes; high winds on the second day chopped up the thermals, and on the third day the pilots had to contend with both high winds and low temperatures. Bernard Carris, of the Elmira Team, made the best flight of the meet in his 2-25, reaching Hammondsport and partial return for a total of almost 30 miles. However, according to the rules a total of 32 miles had to be made before any day could be declared a contest day. Both Gordon Oates in the Slingsby Skylark 3D and Frank Brame in a 1-23D had landed at Monterey, about 18 miles from Elmira, so if a contest day had been declared, the Brantford team would have been in the lead on points as the scoring is a point a mile.

However, weather or not, old friends got together again and the words heard over and over were "wait till next time"—next time being the Snowbird Meet at Harris Hill over the Thanksgiving week-end, November 27-30.—HOWARD LEVY.





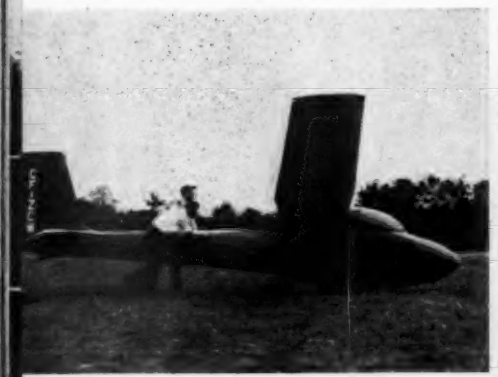
Above are, (top), Frank Brame towed off in his Schweizer 1-23D, and, immediately above, the prototype 2-25 which Bernard Carris, of Big Flats, N.Y., flew at Harris Hill. William Duench (Toronto) and Bill Cooper (Kitchener) also flew a 1-23D; William Adams and Robert Good (Waterloo) were in a 1-19 and James Carpenter (Toronto) flew a 1-26.

At the top of the page, and immediately below, is seen the Slingsby Skylark 3D of Gordon Oates and Eric Best, who are members of the Gatineau Gliding Club, Ottawa.

Right, the new Schweizer 1-29 high-performance sailplane with laminar-flow wing.

Below, right, the general scene at Harris Hill, with 15 of the 17 competing Schweizer 1-26s lined up.

Howard Levy photographs



Correspondence

The Cause of the Smoke

THE text books say that when black smoke comes out of the exhaust of a petrol- or paraffin-burning engine it is a sign that combustion is incomplete—due to there being too much fuel for the amount of oxygen present.

Other text books say that the gas-turbine engine is kept cool by the ability of the compressor to deliver a large excess of air which is available to dilute the products of combustion and thereby cool the exhaust stream so that the turbine doesn't melt.

How, then, does it happen that American jet engines (and only American ones?) emit such large clouds of black smoke?

London, W.6. H. C. BERGEL.

[Mr. Bergel's letter raises a most interesting point—and one that has been the subject of much discussion. He is quite right, of course, in suggesting that black exhaust smoke is a sign of incomplete combustion. It is also true that the gas turbine's compressor passes a very large quantity of air and this helps to keep the temperatures of the efflux down. This does not mean necessarily that the fuel/air mixture is that much weaker, and it is still possible to have incomplete or poor combustion despite the absolute quantities involved. The black smoke associated with some American jet engines is symptomatic of this: but it is more likely to be caused by the use of wide-cut gasolene as fuel instead of kerosene.

Black smoke is also generated, incidentally, when the water-methanol injection system is used in a gas turbine. This, basically, is used for cooling the turbine so as to permit a higher thrust to be developed by the engine for brief periods. This effective relaxation of the turbine temperature limitation means that more fuel can be burnt and the resultant thrust from the engine is greater; it is, however, obtained at the expense of poor combustion (because of the richer mixture) and a lot of smoke. In this respect the phenomenon is not confined to American engines—some British ones can also produce a smoke trail in certain conditions of this sort.—ED.]

Low Down in Amman

CAPT. O. P. JONES' remark as reported in Wren's "Wreminiscing at Croydon" in your September 26 issue reminds me that some three or four years ago Air Jordan operated from Amman and Jerusalem with U.S. Pilots who ran a "Below Sea Level Flying Club."

Membership was achieved by flying over the Dead Sea, itself some 1,300 ft. below sea level.

Istanbul, Turkey. P. M. JAMIESON.

[We made a brief reference to this club in our issue of December 7, 1956. The limited membership then included King Hussein and President Eisenhower. Capt. H. K. Gering, a former Luftwaffe pilot, was in charge.—ED.]

Von Richthofen's Victories

A KIND friend has just presented me with a copy of "Von Richthofen and the Flying Circus." This is an extremely interesting and well-documented history of air fighting from the German side during the First World War. It is fascinating to see "the other side of the hill."

To me, the interesting part of this book is that history proves what we used to say in those far-off years, that Richthofen almost always went for easy targets. By far the largest percentage of his victories were over aircraft such as B.E.2Cs, B.E.12s, R.E.8s and F.E.s. The brave crews of these obsolete aeroplanes simply did not have a chance against him with the latest-type Albatross "Vee-strutter," Fokker Triplane or Fokker D.VII which he was flying.

Almost everyone will agree that the outstanding British single-seat fighter from the end of April, 1917, to the end of the War, was the S.E.5A, and in all Richthofen's long list of 80 victories, only three S.E.5As were included, the first being one of 56's on November 30, 1917.

The first S.E.5A squadron, No. 56, did its first patrol on April 22, 1917, and benefiting by the great example of pilots like Ball, McCudden, Rhys-Davids, etc., had destroyed 257 enemy aircraft by the end of November, 1917; and this included such pilots as Werner Voss, Krebs and Niederhoff, all top members of the Circus.

However, in all that very active time I never remember seeing or hearing that any other member of 56 had any contact with that famous all-red fighter. He was too busy shooting down slow, artillery-observing aircraft which were usually alone without any protection and completely obsolete.

GERALD C. MAXWELL, M.C., D.F.C., A.F.C., A.E.M.
Alresford, Hants.

Groundabout

Aviation Experts Fall Slightly

"Aviation Exports Fall Slightly." — "*The Times*," *Oct. 2.*

"Aero Exports Still Rising." — "*The Financial Times*," *Oct. 2.*

Wishful thinking — or specialist knowledge?

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Name Game. Peter Masefield says that to have an airliner named after you, you have to be famous—and dead. Being a comet-discoverer would help, too, for B.E.A. are naming their "Comet" Class Comets after comets, which seems reasonable enough. Since those astral bodies were named after the chaps who first saw them, we finish up with "William Brooks," B.E.A.'s first 4B. In my opinion a deadly dull name for such a lovely, flashing beauty. Though a fine, manly name for a reader of this column, said he hastily.

*

The Sound, the Smell and the Fury. A friend who works at Stansted tells me he stood near the end of the runway to judge for himself the noise of a heavily laden 707 when it took off. But it was smell, not noise, which made the most lasting impression on him. That black smoke is loaded with paraffin drops, it seems, and they descend upon the earth beneath. Or the local citizens. Hence, I suppose, the complaint from local authorities around London Airport about the 707's smoke.

*

True Story. At an Indian flying display there was a Craziest Pilot competition. Inevitably, it wasn't long before there was a cloud of dust arising from a heap of impacted disintegration. As ambulance and fire engine raced out, the commentator announced: "Ladies and gentlemen, there has been a terrible disaster—I do not know if the pilot is dead—joy riding will now commence."

*

Readers' Corner. Mr. L. F. E. Coombs writes: "In the DC-8 flight simulator, if you haul hard back on the stick, does the TV camera also stall and finish up against the relief map as a heap of broken lenses and works?"

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The Whispering Comet?

"Britannia triumphantly ruled the air waves last night as British Overseas Airways Corporation brought the jet age into reality.—"*New York Sunday News*," *5.10.58.*

by Wren

NOTES AND EVENTS

THORN CATALOGUE.—The Aircraft Components Division of Thorn Electrical Industries, Ltd., of Great Cambridge Road, Enfield, Middlesex, recently introduced a new catalogue of its products. The catalogue has five colour-coded sections (166 pages in all) giving minutely detailed information on the complete range of panel lighting equipment, transformers, power packs, dimmer resistors, miniature lampholders, navigation lamps, electro-luminescent signs, relay cutouts, circuit breakers and the entire series of Thorn connectors.

MORFAX SERVICE. — A new brochure illustrating its service to the engineering industry has been published by Morfax, Ltd., of Willow Lane, Mitcham, Surrey. The company specializes in prototype and experimental work, and short-run production, including precision tooling, machining, routing and fabrication.

SPACE AWARD.—An annual award for the most outstanding contribution to space transportation, the Louis W. Hill Award, has been established in the U.S.A. by the Hill Family Foundation in conjunction with the Institute of the Aeronautical Sciences, Inc. It will be awarded every year for a minimum of five years and will take the form of $5,000 to an individual or up to $10,000 for a team contribution.

FOR MOTORISTS.—The 1958 edition of "*The Motor* Road Tests" was published by our associated magazine, *The Motor*, on October 15. Copies are obtainable from all booksellers or bookstalls at 10s. 6d. each or from Temple Press Limited, Bowling Green Lane, London, E.C.1, at 11s. 5d.

RADIO ABSTRACTS.—The British Institution of Radio Engineers has published a new edition of "Selected Abstracts from the Journal of the Brit. I.R.E. 1946 to 1958." This reference book gives informative abstracts of the main papers and reports which have appeared in the Institution's *Journal* since 1946, and includes papers scheduled for publication in the remaining issues of this year's volume. Copies of the book may be obtained from the Institution, 9 Bedford Square, London, W.C.1, price 3s. 6d.

H.S. GROUP CHANGES—Moves to rationalize Hawker Siddeley Group production of medium and small Diesel and petrol engines include the concentration of production of these units at the Staines factory of Petter, Ltd. Recently, it was announced that some of the engines previously produced by J. and H. McLaren, Ltd., of Leeds, would be transferred to Petters. Now the small engine production of Armstrong Siddeley Motors at Brockworth will also be transferred to Staines. In two months' time Bryce Berger, Ltd., manufacturers of fuel injection equipment, will move to the Group's Gloster Aircraft factory at Hucclecote.

TURBOPROP TEST. — B.E.A.'s new engine test bed for Rolls-Royce Darts came into operation recently at London Airport. This picture shows the engineer's view through the sound-proof window of the control room, with a Dart 506 on the test bed.

C.I. PATENTS.—Information has been sent to us by a Member of the Institute of Trade Mark Agents on the newly enacted First Statute of Patents, Designs and Trade Marks Laws of Jersey and on the Laws of Guernsey; for the interest of manufacturers, traders and other readers we publish hereunder the opening paragraph:—

"*CHANNEL ISLANDS.*—It is a mistaken belief, held by many people, including manufacturers and traders in Great Britain, that British patents, design registrations and trade mark registrations granted by the London Patent Office under the Laws of the United Kingdom of Great Britain and Northern Ireland, extend to and afford protection in Jersey, Guernsey and the other Channel Islands of Alderney, Sark, Herm, Jethou and Lihou. The true position is that neither the United Kingdom Patent, Design or Trade Mark Laws, nor other statutes of the British (United Kingdom) Parliament, operate in the British Crown Territories of the Channel Islands, which are self-governing with respect to all internal affairs."

Aviation Calendar

October 21. — R.Ae.S. Luton Branch lecture, "Fatigue Testing of the Fokker Friendship," by E. J. van Beek (Fokker), in the Napier senior staff canteen, **Luton Airport**, at 18.15 hrs.

October 21.—Institution of Mechanical Engineers, Graduates Section paper, "New High Altitude Test Plant under Construction at the National Gas Turbine Establishment," by F. R. Umpleby, at 1 Birdcage Walk, **London**, S.W.1.

October 22.—Kronfeld Club A.G.M. at 74 Eccleston Square, **London**, S.W.1.

October 23.—British Institution of Radio Engineers, Scottish Section lecture, "Flight Evaluation of Airborne Electronic Equipment," by H. G. Hinkley, at the Institution of Engineers and Shipbuilders, 39 Elmbank Crescent, **Glasgow**.

October 23.—R.Ae.S. Southend Branch lecture, "Air Safety—The Work of the Air Registration Board, by W. Tye (A.R.B.), at the Labour Hall, Boston Avenue, **Southend-on-Sea**, at 19.30 hrs.

October 23-24.—GATCO Convention at **Southend-on-Sea**, Essex.

October 24.—British Institution of Radio Engineers, Scottish Section lecture, "Flight Evaluation of Airborne Electronic Equipment," by H. G. Hinkley, at the Department of Natural Philosophy, Edinburgh University, **Edinburgh**, at 19.00 hrs.

October 24.—Institution of Mechanical Engineers, Internal Combustion Engine Group, Symposium on Engine Noise and Noise Suppression, at 1 Birdcage Walk, **London**, S.W.1, at 16.00 hrs.

October 27.—R.Ae.S. Guided Flight Section lecture, "The Bloodhound," by D. J. Farrar, F.R.Ae.S., at the Institution of Civil Engineers, Great George Street, **London**, S.W.1, at 18.00 hrs.

October 29. — R.Ae.S. Graduates and Students Section, film show, in the library, 4 Hamilton Place, **London**, W.1.

October 29.—R.Ae.S. Weybridge Branch lecture, "The History of the Supermarine Organization," by A. N. Clifton, B.Sc., F.R.Ae.S. (chief designer, Supermarine Works), at the Apprentice Training School, Vickers-Armstrongs (Aircraft), Ltd., **Weybridge**, at 18.10 hr.

October 29.—R.Ae.S. Gloucester and Cheltenham Branch lecture, "Landing Hazards on the Moon and the Use of Space Stations," by A. F. Collins, F.R.Ae.S., F.B.I.S., at the High School for Girls, Widemarsh Street, **Hereford**, at 19.30 hrs.

October 29.—Kronfeld Club talk, "Aircraft at Leszno, 1958," by Peter Brooks at 74 Eccleston Square, London, S.W.1.

October 29.—R.Ae.S. Hatfield Branch lecture, "Some Recent Developments in Aircraft Casting Manufacture," by R. W. Eade (J. Stone and Co. (Charlton), Ltd.), in the de Havilland Restaurant, **Hatfield**, at 18.15 hrs.

AUSTRALIAN EXPANSION. — Simmonds Aerocessories Pty., Ltd., an Australian subsidiary of Simmonds Aerocessories, Ltd., has announced plans for a new factory and administrative building to be put up near the company's present factory in the Guncotton Area of Ballarat, Victoria.

Company Notices

NEW COMPANY

Autocovers, Ltd. (611,984).—Private co. Reg. Sept. 29. Cap. £1,000 in £1 shs. Objects: To carry on the business of manufacturers of and dealers in motor vehicle and aircraft interior and exterior coverings, furnishings, etc. Directors (as stated in Articles of Association): Alan Levett, 11 Court Drive, Stanmore, Middx; Isadore H. Usiskin, 6 Brockley Close, Stanmore, Middx; Jeannette M. Levett and Bessie Usiskin. Sec.: A. Levett. Reg. Off.: 9 Clarges St., London, W.1.

INCREASES OF CAPITAL

Agricultural Aviation Co., Ltd. (605,010).—Crop spraying contractors, etc., Midland Bank Chambers, Howardsgate, Welwyn Garden City.—Increased by £1,900, in £1 ordinary shs, beyond reg. cap. of £100.

Blackfen Engineering Co. (1944), Ltd. (390,383).—Electrical and mechanical engineers, specialists in airfield ground equipment, etc., Dewlands Farm, London Rd., Stone, nr. Dartford, Kent.—Increased by £3,400, in £1 ordinary shs., beyond reg. cap. of £100.

New Patent

APPLICATION ACCEPTED

805,097.—Minister of Supply.—"Parachutes."—Dec. 14, 1956. (Nov. 10, 1955.)

Application open to publication on Nov. 26, 1958; opposition period expires on Feb. 26, 1959.

Birth Notices

Dunn.—On Oct. 1, at the Avenue Nursing Home, Hull, to Pamela (*née* Atkinson), wife of Sqn. Ldr. A. Dunn—a son.

Burton.—On Oct. 1, at Hampton Hill, to Paula (*née* Buswell), wife of Sqn. Ldr. R. G. M. Burton—a daughter.

Campbell.—On Oct. 1, at Ringstone, Salcombe, South Devon, to Pamela (*née* Kinahan), wife of Wg. Cdr. A. M. Campbell—a daughter.

Field.—On Sept. 30, at Farnborough Hospital, Kent, to Harriett (*née* McAdoo), wife of Sqn. Ldr. D. Field—a son.

Jones.—On Sept. 29, at the North Walsham Cottage Hospital, Norfolk, to Betty (*née* Goodger), wife of Flt. Lt. P. J. Jones—a daughter.

Snow.—On Oct. 2, at Adelaide, Australia, to Marion (*née* Cannon), wife of Flt. Lt. J. Snow—a son.

Stack.—On Oct. 4, at Odstock Hospital, Salisbury, to Virginia (*née* Todd), wife of Gp. Capt. T. N. Stack—a son.

Williamson.—On Sept. 29, to Jill (*née* Harvey), wife of Sqn. Ldr. P. G. K. Williamson, D.F.C., R.A.F. H.Q., 6th A.T.A.F., P.K.527 Izmir, Turkey—a son, who lived only a few hours.